TELEPHONE ENGINEER

Vol. VII CHICAGO, APRIL, 1912 No. 4

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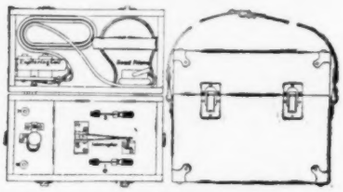

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CHICAGO, APRIL 1912.

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SUPREME COURT PATENT DECISION.

THE United States Supreme Court has just handed down a decision to the effect that a patent right constitutes an absolute monopoly. This opinion, however, was not without dissension; for a minority opinion takes exception to the absolutism of the prevailing opinion. But the decision stands, and only an act of Congress can mitigate it by establishing new provisions in the laws governing present conditions.

The decision merely gives legal recognition to a principle under which owners of patent rights have always operated, it is true; but it establishes the security of patent monopoly beyond question. In that respect it affects vitally every industry—the telephone industry perhaps less than most others.

That a patent right should constitute a monopoly is not, in itself, cause for alarm. Any true invention is the materialization of an idea as much the property of the inventor as his right to live and work. The defect in the theory is that any combination of patent rights in an industry under one ownership operates to deprive the inventor of the full benefits of his monopoly, since his sole markets is a greater monopoly.

Our patent laws are full of defects which the Supreme Court decision does nothing to help. Probably the most beneficial effect it can have will be to stimulate activity toward a thorough revision of the patent laws.

WRITE AND WIN A PRIZE.

JANUARY TELEPHONE ENGINEER announced editorially and otherwise a series of prizes to be given to those whose ideas for the popularizing of long distance telephoning seem most practical and useful. It is only necessary to write those ideas in coherent and consistent form and send them to us, to be entered as a contestant for one of the prizes.

The rules of the contest and the causes for it were laid down at some length in our January number. But our supply of copies of that number was almost immediately exhausted by the interest in that very feature. So we are explaining it all over again here; and since we are unable to put it any more clearly than we did before, we simply reprint the former announcement, together with the following editorial of January, 1911, which was entitled "The Dread of Long Distance." It is that very real dread that we have undertaken to find a remedy for; and, like all forms of fear, the only cure lies through suggestion. It is for the contestants to supply the suggestion. Here is the editorial on the subject:

"A slave to the telephone" is what the editor of a New York paper called E. H. Harriman. For the late railroad

magnate was one of the comparatively few, even in the telephone age, who appreciate to the full extent the commercial value of that institution. He was never out of reach of an instrument, whether in his bath, at his bedside, or on his dining table. Even when he went into the wilderness the telephone must be there. "A slave to the telephone." And when he heard that, he said, "Nonsense! The telephone is a slave to me!"

No doubt when Mr. Harriman had occasion to talk to Chicago from his New York office he took up his receiver and talked with the same aplomb as when he used an intercommunicating set. And, no doubt, in this he gained an advantage over his auditor at the other end of the line, who probably was less at ease and consequently less inclined to aggression.

For it is not yet given to most men to participate in a long distance telephone conversation with any degree of *sang froid*. Whether it is a dread of the unfamiliar, a fear of unsatisfactory results, or an awe of another city, the fact is that the average man shrinks from receiving, and dreads to originate, a long distance call.

We have no intention of pondering the psychology of this phenomenon, although doubtless it is very simple. But we do insist that it should receive profound consideration by telephone engineers. There used to be people who dreaded riding on railroads, and the attitude of most women toward telegrams is still a subject of comment. The railroads have cured the prejudice by making their service attractive. In some other countries the telegram lacks its sinister significance because its use has been made absurdly easy and convenient, so that it is as common as the picture postcard. In Mexico, for example, one buys a card for 5 cents, writes a message, and drops it in a box, whence it is collected and transmitted by wire, to be delivered a few minutes later transcribed on a similar card. The Mexican women do not dread the telegram.

Yet the telephone companies have striven expressly to make long distance telephoning as attractive as possible. Their engineers have devoted years to perfecting voice transmission over long lines. Their operators are trained to give all possible assistance at both ends of the connection and to bear all the burden of finding and capturing the called party. All the originator of the call has to do is to name his desires. As this apparently ideal arrangement has not served to remove the dread, something more is evidently necessary.

Of course, the present long distance telephone traffic of the country is really tremendous. But this is a tremendous country, and its telephone possibilities are so far ahead of its actualities as to make the latter seem poor indeed. And they will be poor as long as the average man dreads the long distance call. That the dread really exists needs little observation to confirm.

What the cure for this condition is we will not pretend to suggest at this time. Perhaps some of our readers have ideas on the subject. If so, we would be glad to hear from them.

Since that editorial originally appeared we have been asked over and over again to suggest a remedy for the ill—as though mere diagnosis betokened curative ability. For toll business is profitable, and existing toll lines could carry a great deal more traffic than they do.

But the dread is there, in the public mind, whether the line be a thousand or only fifty miles long; whether the originating instrument be manual, semi-automatic or full automatic. In fact, as soon as the word "toll" appears in the directory the public shrinks from its telephone.

So that is the question before the telephone body. How can we make long distance more familiar, natural and attractive to the public? What means can we use to convince the laity of the ease of long distance?

TELEPHONE ENGINEER offers a series of cash prizes for the four best solutions of the problem. The first prize is $50, the second is $25, the third $15 and the fourth $10. The contributions to the contest should take the form of essays not over 2,400 words in length, and as much shorter than that as may be desired. They should be of such a nature that they may be presented direct to the public, for it is the public whom we must interest; although articles containing suggestions for telephone managers will not be barred and may win a prize.

A display announcement giving all conditions of the contest appears on another page. Please observe the rules as to typewriting, folding and addressing manuscripts. The contest closes July 1, 1912, by which date all essays must be mailed to this office to be eligible. The winners will be decided by a board of judges, whose personnel will be announced at that time, and the prize-winning essays will be published in TELEPHONE ENGINEER as soon thereafter as possible. And to be prize winners they will have to be of practical value—not merely dissertations on the conditions as they exist, nor catalogues of the already well-known and advertised advantages of long-distance telephony. Remember, we have got to make the public *feel* that long-distance telephoning is the simplest, easiest and cheapest thing in the world.

There are no restrictions or conditions other than those named. Every reader of TELEPHONE ENGINEER is eligible as a contestant. Get busy!

THE A. T. & T. REPORT.

THE report of the American Telephone and Telegraph Company for the year of 1911, just placed before the stockholders of the company, shows a gain in net earnings over 1910 of $1,368,000. The gain for 1910 over 1909 was $1,742,548.63. The gain in Bell and connected subscribers' stations, 1911 over 1910, is 749,906; the gain of 1910 over 1909 being 740,027. The discrepancy is partly due to the small growth of long distance business in 1911, the gain for the year being under five per cent. Better business conditions this year will create a decided improvement in this respect, and the report for 1912 may be expected to compare still more favorably with its predecessors. There will also be comparatively little increase in outstanding capital stock this year.

During the last two years the company has advanced over $23,000,000 to its associated companies in exchange for their stock. These were mostly non-dividend paying companies, which it is expected will be put on a profitable basis. This action decreased the annual revenue of the parent company $825,000. Nearly $19,000,000 bonds was converted into stock and over $40,000,000 new stock issued on account of the $55,000,000 offered stockholders last summer. All these are reasons why the 1912 report should show better than the current one.

A summary of the report which appears on another page, gives all the details of the company's progress during 1911 that the average reader will care for. It shows that the company is doing an enormous business and that it is a stupendous monument to the necessity of the telephone and the absolute stability of the industry.

As usual, there is much matter included in the report that is not inherently peculiar to the A. T. & T. Company, but which offers valuable information to the telephone operator in general. In this category comes the section on "Reserves and Depreciation" in the present report, which we abstract here in the belief

that the views of the company's officials will prove interesting to others:

While commissions and all thorough investigators are agreed that provision must be made out of current revenue for depreciation and future replacement of plant, there seems to be some tendency on the part of others to question any accumulation of reserves.

To make adequate provision for future contingencies it would seem to be plain that in an increasing business there must also be an increasing reserve.

There seems to be a tendency to insist that "betterment" of every character shall be represented by capital issue, and that depreciation reserve should be determined with precision, and that it, and all reserves beyond it represent excessive gross charges; that is, gross charges greater than are necessary for the legitimate purposes of the company.

Reserves are a provision for deterioration and obsolescence of plant beyond that which can be covered by current maintenance and current replacements, and also for deterioration of assets and for fluctuations in gross and net revenue caused by varied business conditions. If there were an exactly ascertainable condition, with which all practice is in accord, many of the difficulties and differences of opinion connected with this question would disappear.

If the plant were kept in the highest possible state of efficiency by the expenditure of current revenue for repairs, maintenance and replacements, sufficient to maintain the plant at the highest possible efficiency, it could be operated perpetually and would never have to be replaced. Between this, and maintenance which barely keeps the plant in service, there is a wide margin, and in this margin is the origin of nearly all the differences as to cost of service, and in it is the opportunity to show large apparent profits at the cost of the future of the plant.

There are, however, in the conduct of business many conditions and possibilities which can not be met out of current net revenue and should not be met out of capital, but which, if not provided for in some way, would put all industrial companies upon a speculative basis.

There is that obsolescence which comes from revolutionary improvements necessitating wholesale replacements of obsolete apparatus or plant, such as the replacement of overhead systems by underground systems, or such as took place when the present method of operating was introduced. There are those fluctuations in net revenue caused by business depression which cannot be overcome by immediate reduction of fixed charges, overhead expenses or operating costs. There is that constant tendency to increase in wages and cost of material, that tendency to increase in operating expenses and capital charges caused by the constant demand for increased efficiency or service, that demand for extensions, productive and unproductive, and that call for improvements in plant, equipment and apparatus. There is that increase in costs of operating, in greater ratio than the increase in business, peculiar to some branches of the telephone service.

These and many other possibilities always confronting industrial and public service undertakings must be provided for. They are not the subject of capital expenditures, and can only be provided for by an accumulating surplus and reserves invested in productive plant or securities. If these are not provided for, trouble, if not disaster or destruction, is inevitable.

Any practice which does not, at the cost of revenue, pass the property on from the present to the future in at least as good a condition as received from the past is a mistaken practice; it is using capital for the benefit of the present at the expense of the future.

The main objections urged against an accumulating surplus are the following:

1. That it is provided out of excessive charges to the public for service.
2. That it tends to extravagance of operation, on the theory that close margins tend to greater economies.
3. That it affords a way of giving exorbitant and unreasonable dividends to the shareholders by some form of distribution of the surplus from time to time.

The answer to the third objection depends somewhat on the treatment and ultimate disposition of the unappropriated surplus reserves.

If these reserves are to remain as assets of the company, indivisible, inviolable and inalienable except for the purposes above mentioned, invested in productive property, it removes the strongest and only really tangible objection to surplus of the character herein advocated.

As to the second objection: The most important and controlling factors of all charges for service are fixed charges and operating expenses. All public service companies not now, will soon be under government control and regulation, and all charges and expenditures will be under the close scrutiny of these regularly constituted bodies. If this does not protect against extravagance nothing will.

In answer to the first objection, the many and marked peculiarities of the telephone and telegraph as distinguished from other public utilities justify ample surplus reserves.

Any new railroad or plant of local transportation company, gas or electric light mains must be constructed at least of a certain minimum standard or capacity, and as the cost of construction does not increase in nearly the same ratio as the increase in capacity, a large increase of business is always provided for in the building of any new plant. Another important consideration in the size of plant constructed is that in emergencies large overloads can be carried on plants of this character for considerable periods. For these and other reasons additional capital expenditure is not continuous, seldom, if ever, is imperative, financing arrangements can be definitely anticipated for long periods and adapted to the most favorable conditions and times.

With the telephone and telegraph the case is entirely different. Except below relatively small minimum units, the telephone plant is built according to the business that is expected in the immediate future, and the plant necessary for the development of business can be added as needed, and to save charges on idle plant this is done. It is sometimes advantageous to anticipate growth, and it is often, but only done when the saving in construction costs and other advantages more than balance the cost of carrying the idle plant. There can be no overload in the telephone business; the capacity of the plant must be equal to the peak of the business and to all possible emergencies. Each increase in business calls for an additional telephone circuit and each telephone circuit calls for additional capital expenditure, and under the requirements of the business all demands for extension of service are imperative and must be met at once.

This makes necessary regular periodical provisions for financing, which must be met regardless of the general business conditions.

Another, and a marked disadvantage of the telephone business as compared with other public services, is that the capital expenditure for gas or electric light plant is confined to generating plant and distributing mains; the customer's connection from street to house and the inside house installation are done with the capital and at the cost of the customer.

With the telephone each additional subscriber calls for capital expenditure from the central office to the house or place of business, and for all interior installation and wiring. This interior installation, representing large expenditure, is a burden not only on the capital, but on the net revenue of the telephone, from which other service companies are free. For every 100,000 stations gained in 1911 272,000 stations were installed. All the cost of the 172,000 over and above the salvage, which is variable and small at best, is a charge upon revenue and a general charge on all permanent subscribers, which would not be the case if the interior installation were at the expense of the subscriber.

All the advantages of an unexpended surplus reserve which remains invested in an inalienable asset of the company, namely, in productive plant, accrue to the public by the reduction of revenue which it is not necessary to earn to meet the capital charges, as the plans which is constructed out of these surplus reserves does not represent capitalization.

Among the more important advantages to a company of a large surplus represented in the fixed assets are the following:

It strengthens the company's credit, enabling the company to make its interest and dividend payments uniform and dependable.

It enables the company on the strength of this credit to obtain its capital requirements on the most favorable terms.

It enables the company to ride out commercial and

financial disturbances which might otherwise cripple or destroy it.

It enables the company to maintain at all times the highest state of efficiency in its operation, which would be impossible for any company which is obliged to adjust its more or less inflexible operating expenses to the constant and inevitable fluctuations of business.

It is a reservoir, as it were, which, supplied by a fluctuating stream of gross revenue, enables the company to maintain even and uniform disbursement for service, maintain a uniform operating organization, and that high state of efficiency which can result only from a permanent operating force.

To reduce rates as fast as any surplus is created; to forbid any application of revenue to the betterment of plant; to insist that new capital shall be provided for such purposes would never be thought of in any private business and should not in any corporate business, particularly public utilities, subject to other regulation and control than that of actual ownership. In individual or partnership business all revenue beyond stipulated amounts is left in the business as a reserve, and in addition there is that reserve consisting of the entire assets of the individual. This is the basis of business credits.

The only sound conclusion that can be reached after full consideration of all the various phases and factors of the problem is that ample reserves should be provided to meet not only probable happenings, but possible happenings, and that such reserves should be so invested that whatever increment or revenue is to be derived from the amounts unexpended or not used for the purposes intended will go to the public in reduction of charges for or in improvement of service, and that the value of a public utility plant should be represented by a relatively small percentage of outstanding securities calling for fixed charges.

No expenditure which does not produce increased net revenue should be capitalized.

Any public service plant which is represented by relatively small outstanding capital obligations is stronger, can better meet its public obligations, and so long as the surplus is inviolable and inalienable, as above defined, and the company under government control and regulation, the greater the ratio of surplus and reserves to plant, the nearer we get to all the supposed advantages of public ownership without any of its risks, while retaining all the advantages of private management.

BLAME TELEPHONE FOR HIGH PRICES.

Persistent use of the telephone by consumers and the fact that only the producer has been able in recent years to make a profit out of the sale of foodstuffs were the reasons assigned for the high cost of living by witnesses who testified recently before the Food Investigating Committee in New York.

H. H. Hawkes, a dealer in dairy products, said that the department store custom of educating customers not to carry their purchases home and to a great extent to have their orders transmitted by telephone has become so general that consumers have extended this method of shopping to include marketing. So many small orders are received by telephone, he said, that the cost of delivering them exceeds the profit of their sale. As a consequence prices go up.

Other retail dealers accused the telephone also, and said that a customer finds use of the telephone so convenient that it is seldom a full order is contained in one message. This means, it was said, that two and more deliveries to the same houses, instead of one, must be made.

A new one is born every minute—not a sucker, but a business man, a buyer of goods. The old ones all know you. Some of them may even remember you when you don't advertise. But the new ones don't know you're living. You'll have to tell them in your advertising.

A Lot of Loaded Lines

TO OPERATE.

"To operate!" The words confess
A lost appendix, or express
A way of handling sucker's bait;
Or the achievements indicate
Of motor-boat or printing press.

Another sense the words possess
When cords and keys and loveliness
Combine, in answering "two-four-eight,"
To operate.

We recognize that usage—yes;
But operating for success
Means books, and buildings, and a rate;
To know your service, and the state
Of every wire. That's readiness
To operate.

They are knocking the economy of ordering your victuals by telephone because you can't see what you're buying. The missus insists, though, that telephone ordering saves her buying everything in sight that looks good. Keep on using the telephone, say we.

ANOTHER AFFLICTION.

[From the New York *Commercial.*]

Cambridge, Mass., March 11.—The local telephone company is to have a dose of psycholigicalism injected into its business conduct a la Muensterburg.

DO YOU GET HIM?

[From a paper by A. E. Mellick, Dunedin, N. Z.]

A magnet is a hoop of metal with a hiatus, that it is endowed with a complete orbital gyronic movement through its fabric and hiatus, which in its action attracts cosmogonic gyrons in a certain ratio to the feebleness of intensity of the orbital gyronic movement; that the gyrons, still continuing their journey through the space of the hiatus, continue to attract cosmogonic gyrons to the extent of attracting the gyrons of pieces of metal which may be in their neighborhood. The lines of force are broken by the revolution of the armature, conducted to the commutator, collected by the brushes, conducted to the magnet, thus stimulating it to an excesive degree to attract a larger number of cosmogonic gyrons, and at length sent on their errand of usefulness in providing us with power, light and heat.

WE KNEW ALL ALONG IT WAS NOTHING BUT GOSSIP.

[From an interview in the Big Rapids (Mich.) *Herald.*]

Personally, I have always been pleased with Miss Learned's service and I believe that everyone else has. But this talk of being charmed by her voice is all tommy-rot and not relevant.

THE WORLD DO MOVE.

From the *Daily Consular and Trade Reports.*

No. 8172. Muslins and Telephone Apparatus—A report from an American consul in an Asiatic country states that a merchant in his district desires to correspond with an exporter prepared to furnish bleached and unbleached American muslins. It is also stated that a local resident is preparing to install a new telephone line. Two or three instruments and about four miles of wire will be required for this undertaking.

THE SECOND POST.

[A letter to a telephone manufacturer.]

Your letters Received and Everything sadisfactorily and Want you to fill the following order for me 2 Phones complete 1 Phones With condenser 3 Protectors you nead not send only 2 Receivers and one receiver cord and i will use the Extra receiver on on that i have hear on hands i am going to send you the money for My own Phone the other 2 phones is fer the Company they did not send me the Money but i am sadisfyed to stand Responsible for the Payment i have 60 acres of land With a good House upon it with Clear title and nothing Entered against it if this is not so you no it Would be fals Pretense But if you are not sadisfyed With this statement Send them with a Side Draugh and it Will be no insult to me as i Wish to deal squarely With you Please ship at once.

LINES OF FORCE.

The clerk at fifty dollars a month often wonders how the poor laborer at two dollars a day manages to live.

The man with the nerve gets the job. The man with the ability leaves it for a better one.

Don't judge a man's salary by the cigar he smokes.

P. H. W.

The "Aid-System" in Copenhagen

Automatic Distribution of Calls

When the number of telephone subscribers in a city becomes too great to be connected to a single multiple switch-board, the work of manual operating grows so rapidly that considerable economical and technical difficulties arise. In Copenhagen, with its 550,000 inhabitants and about 40,000 telephones, the entire telephone plant has been rebuilt in the course of latter years. The choice of plant and working system is based on an exhaustive study of telephone operating. The present article refers to one of the special technical devices, the "automatic aid-system," invented by Director Fr. Johannsen, on which

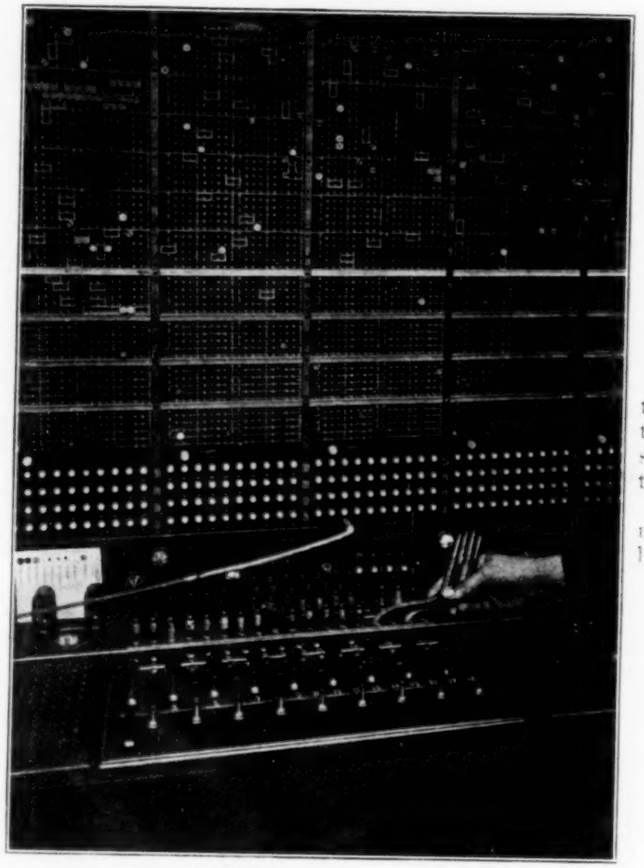


Fig. 1. Typical Position in Copenhagen Main Exchange.

patents belonging to the Copenhagen Telephone Company have been filed.

The aid-system, which can be used not only in new but also in old exchanges of the double cord system—magneto as well as common battery—is intended to lighten the burden of the operators in busy moments. The aid-system requires only slight alterations in the switch-boards proper. Three of the answering cords in each operator's position are connected with automatic selectors and in this way changed into "transfer cords." When the operator uses such a cord in attending to a call, she will transfer the call to a disengaged colleague, the automatic device moving along till it reaches a wire from a disengaged operator within the same group of 20 operators to which the first operator belongs. Even in extremely busy moments, the probability of finding all 20 operators engaged is very slight, and therefore the transferred subscriber will quickly get an answer. On the position to which the automatic selector connects the subscriber, a lamp is lit opposite a calling-cord ("receiving cord"), of which

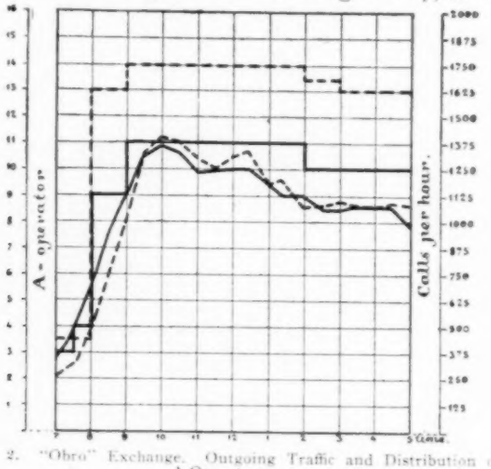
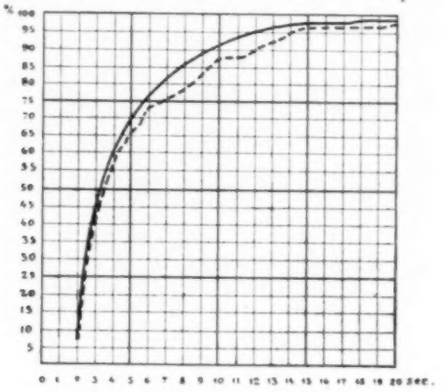


Fig. 2. "Obro" Exchange. Outgoing Traffic and Distribution of A-Operators.

there are four at every position. The operating of the transferred call is the same as in operating the single cord system. After the conversation is finished, the clearing out signal appears.

Fig. 1 shows a position in the new Copenhagen main exchange. As a rule, the operating takes place by means of the usual pairs of cords. Only when the



– – – – Before aid-system in use.
——— Aid-system in use.

Fig. 2a. Waiting Time.

operator and her neighbors are very busy, the aid-system is used. In the aid-system there are essentially the same advantages as in the so-called distribution system, only with the exception that the dumb operators are rendered superfluous, their function being partly substituted by the A-operators and partly (in the selection of a disengaged operator) by the auto-

matic selector. Thus the operator can, at her own option, act as service operator in a double-cord multiple system or as dumb operator in a distribution system.

This system may also be compared with the so-called overflow system, only with the difference that the operator here does not need signals to inform her that the ancillary operator's positons are disengaged or engaged. The ancillary positions are rendered superfluous, since the transferred calls, as we have already said, are transferred, not to special ancillary switch-boards, but to regular service operators in the same group. The signals are superfluous, because the disengaged position is found automatically. The effect of the system most resembles that of the American ancillary jacks, but is considered superior to it. because the operator is not disturbed by the many lamps which she cannot and shall not answer. The Copenhagen company has replaced ancillary jacks on toll recording positions, in information office, etc., by

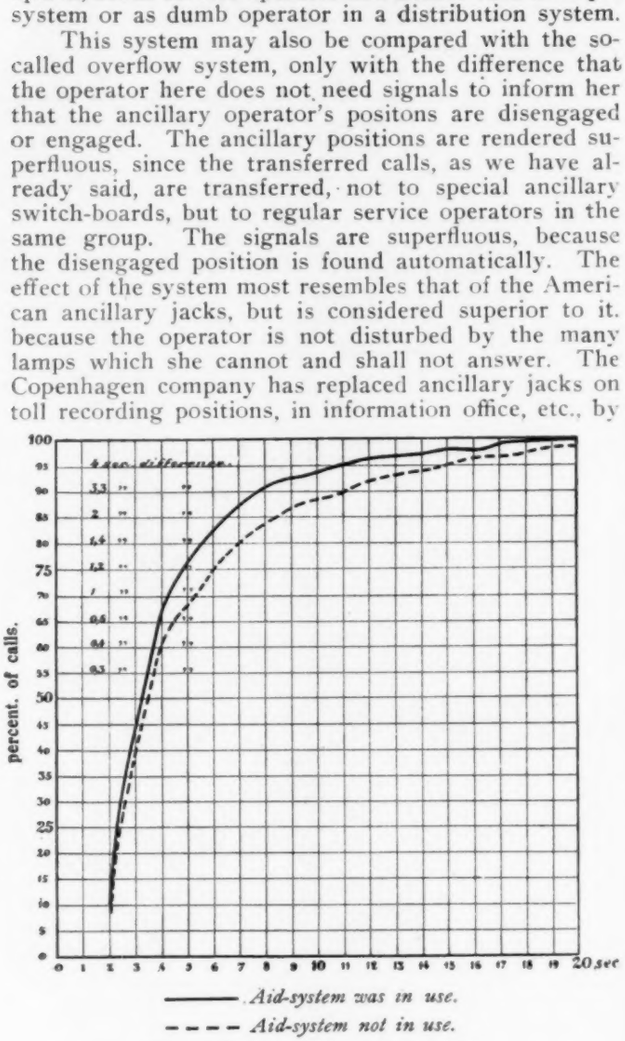


Fig. 3. Waiting Time on "Obro" Calls.

automatic selectors acting in the same manner as in the aid-system.

Against the aid-system it has been objected that the A-operator cannot see from what line a toll call originates, but by asking the subscriber for the number of his line it is very easy to prove this through the multiple. This would suit the well known demand from subscribers with many extension stations (hotels, big stores etc.), that toll calls should be ordered only by the operator at the extension board.

The Copenhagen Telephone company considers that the aid system possesses a number of distinct advantages. In an overworked exchange there is so much labor saved that the operators are no longer over-exerted. Furthermore, the subscribers are much better served. In a well-organized exchange with normal waiting-time, it is possible either to save the expense of several operators or to allot a larger number of subscribers to each operator. Outside the busy hours, it is possbile, to a greater degree than otherwise, to let some positions stand unused, since the neighboring positions, when they are over-loaded, can make use of the aid-system—not only their own transfer cords, but also those belonging to the neighboring positions. Besides the daily economy, this is of great significance in the summer, which is not so busy as the other seasons of the year, for by the use of the aid-system it is then possible without inconvenience to give the operators a summer vacation to a greater extent than otherwise. It is possible to economize the expenses of the plant, since each position can be adapted for many more subscribers than would be possible without the system. A further economy in building new exchanges can be attained by being able to omit the intermediate field, for, when the aid-system is used, it is less essential if one position is somewhat busier than another. Finally, by installing the aid-system in an old exchange already in use, it is possible to extend the period of its usefulness by several years, which has, in fact, been done in some of the Copenhagen offices, and which will be of very great economic importance in cities, where it is difficult to decide to adopt a new system.

RELATION TO THE OPERATORS.

If it is asked what is the attitude of the operators in relation to the fact that, owing to the adoption of the aid-system, they have more work, the company has found that they are quite satisfied with the arrangement. Since they are forbidden to talk to each other, as is the case in all modern offices, they have been much bored during the hours when there was not much to do, and on the contrary became nervous, owing to over-exertion, in the busy hours. During the busy hours it is now a comfort to have the aid-system to fall back on. They work less nervously and are less rushed, and therefore get more done, while the demoralizing ennui of the dull hours is lessened by an evener distribution of the work. Experience has proved that the telephone operators in Copenhagen consider the aid-system a relief, notwithstanding the fact that their average number of calls per hour has been increased.

Besides the direct benefit, the aid-system is important on account of the opportunity it gives the superintending officers to economize in the expenses for operators and to show more justice in distribution of the work, by giving a busy position less and an idle one more calls. If an operator tries to shirk during busy hours, the transferred calls will automatically find their way to her position. No abuse of the system by lazy operators, by blockading their positions, has been observed. This would at once be noticed by the neighbors or the supervision.

RULES FOR USE

The aid-system must be used according to certain simple rules, which are essentially restricted to the following.

(*a*) A call that is to be transferred must be transferred at once. This rule is not difficult to impress on the operator. First when she can see that there will be too long a wait, she transfers the next call. The transferring does not take place until both the operator in question and her two neighbors are engaged and one lamp is lit previous to the one whose call is to be transferred.

(*b*) A call that has been transferred from another board shall be given preference, even if the operator, in order to answer it, is obliged to transfer one of her own calls.

By following these rules, which in practice have soon been found to be successful, the aid-system covers one hundred per cent of the calls during busy hours.

There is one little disadvantage which, however, may almost be called an advantage, namely that the inspectors in charge have more trouble in distributing the work, as it is possible and desirable to arrange the service at the switchboards more carefully than heretofore. This, however, only serves to encourage an intelligent and dutiful inspection.

TRIALS WITH THE AID-SYSTEM

Exhaustive trials, for the purpose of investigating the functioning and economy of the aid-system, were made in a central office in Copenhagen called "Obro," where the apparatus has 15 A-positions. The working of the exchange had about ninety per cent trunking. At the beginning of these trials in the spring of 1909, 14 of these positions had 160 engaged subscriber jacks each. As a result of the introduction of the aid-system, it was possible in the course of the year to assign 220 jacks to each position instead of 160, thus reducing the number of positions in use from 14 to 10. Notwithstanding the increased traffic at each position, the waiting time for the subscribers was shorter than previously, when the traffic was not so intense. Besides the considerable annual economy in running expenses, there was also a great saving in the cost of the plant, for before the aid-system was introduced, it was considered necessary to enlarge the exchange, since there was only one idle position with 160 jacks. After the introduction of the aid-system, there were five idle positions, with 220 subscriber-jacks, giving an opportunity to increase the number of subscribers by 1100. Thus the planned enlargement of the office could be postponed for several years.

The entire economy which was attained, however, was not all due to the aid-system directly, but also indirectly to the careful investigation of all the working conditions of the central which was caused by the introduction of the aid-system.

With respect to the indirect economy, it is noticed that, under ordinary circumstances, when an attempt is made to improve the service, the operators frequently consider it to be intended to press more work out of them, but this has not been the case with the introduction of the aid-system. The operators seem at once intuitively to feel that it is a very practical and agreeable arrangement, which does away with all anxiety and nervousness in the busiest moments.

DETAILED REPORT OF THE TRIALS

The results will be seen in the diagram, Fig. 2, which shows conditions before and after the introduction of the aid-system in April and October, 1909, respectively.

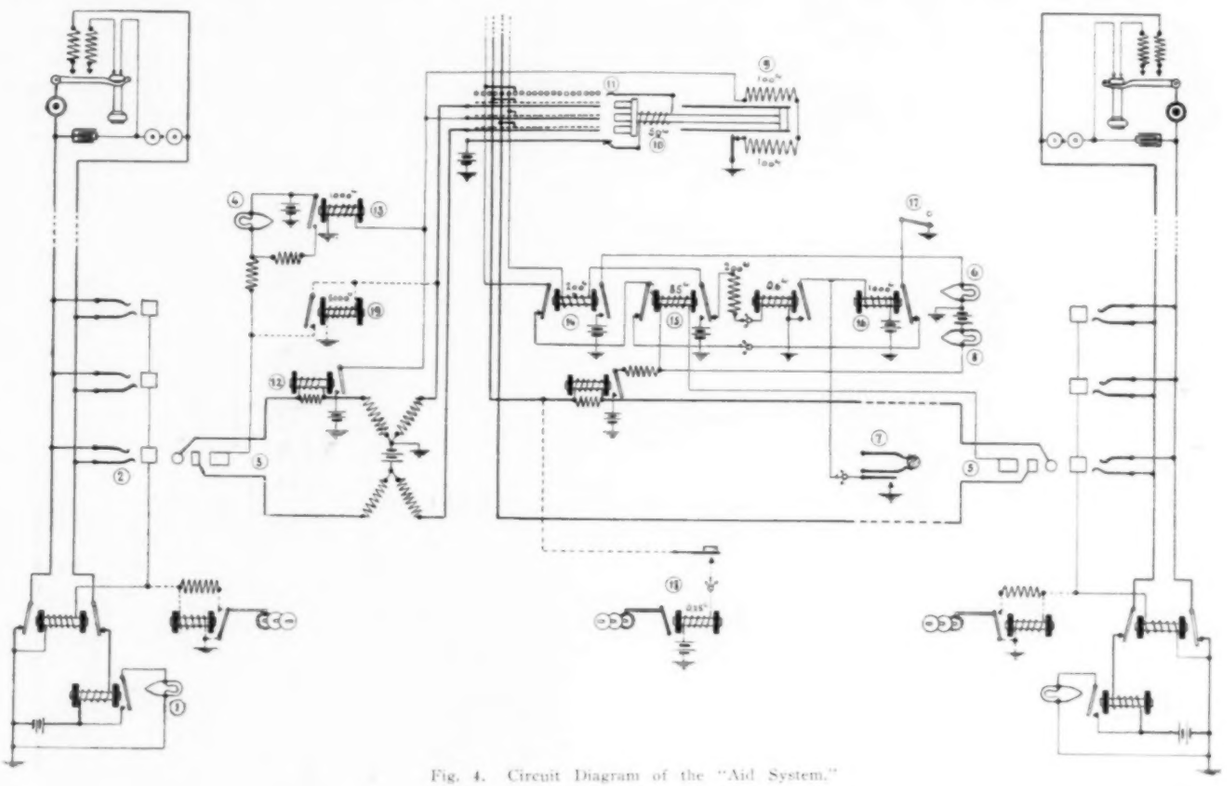


Fig. 4. Circuit Diagram of the "Aid System."

The figure shows that the traffic was about the same in April and October. Nevertheless the number of operators was reduced at all hours of the day, and still the service was improved, as also will be seen by Fig. 2, which shows how long the subscribers had to wait for a reply to their calls, both before and after the introduction of the aid-system.

The economy attained at "Obro" is greater than shown by the diagram, since in the summer there has been a great saving of service hours. For a long period during the summer of 1909, only every second A-position was in use, and in the transition from and to busy hours, the number of operators was evenly changed by adding or removing one operator at a time.

The whole economy of service attained at "Obro" at the A-boards amounted to about 30 per cent. If we deduct one third of this as due to better management and training and a better equipment of the central with junction-lines, there will remain a saving of about 20 per cent due to the aid-system (see the control check given by Fig. 3). In connection herewith it may be remarked that the aid-system at the "Obro" central has not had an opportunity to work under the most favorable conditions, the number of A-operators having been too small. During the time of the trials, this number was reduced from 14 to 7 in the dullest part of the summer, and increased again to 11 in the most busy hours of the day, later on when the number of subscribers as well as the traffic in general become greater. While disengaged positions, as a rule, were blockaded for the receiving of transferred calls, it is understood that the selector of a transferred subscriber has only had an opportunity of hunting for a disengaged operator at from 6 to 10 positions, while the system will be of still better effect if the automatic selector has an opportunity of hunting over up to 20 positions.

The trials at "Obro" were made in easy time, in order to be sure to obtain reliable control-results in concentrating the subscribers. It was then found that the service was by no means made poorer by this concentration which took place after the introduction of the aid-system, one position being emptied at a time, with about one week's interval. During the trials, repeated control-calls were given from the main distributing frame, and the *a* (*alpha*)* of the operators was controlled by means of an automatic *a*-clock which was read off each hour for each switch-board. Every *a*-clock started of its own accord when one of the listening-keys of the switch-board was opened, and stopped as soon as the listening-key was closed. To the *a* indicated by the clock a certain percentage had to be added for work done in plugging and unplugging, which was calculated once for all and proved to be less for a large *a* than for a small *a*, since a large proportion of this work in busy hours is done at the same time that listening-keys stand open.

The determination of *a* per hour and position was of importance not only in order to see if the concentration was carried too far, but also to decide if eventual complaints from any of the operators over being worked harder than others were well founded. The use of *a*-clocks gives a general idea whether the respective operators do too little work or not. While *a* is almost identical for all positions during the busy hours, when transferred calls come in to disengaged operators, there will naturally be some difference in the *a* of the respective operators during duller hours, when the transferring only takes place in a smaller degree. It is always a bad sign when the *a* of an operator is essentially lower than that of her two neighbors. It might be added that the aid-system should tend to lessen the difference between busy and dull hours. Tests have, however, proved that it is not economical to go too far in equalizing. The centralization should take place to such a degree that the operators in the most busy forenoon hours, notwithstanding the presence of the full number of operators, will be somewhat harder worked than the average for the whole day.

In daily work the *a*-clocks are of great importance for all changes in the number of operators. By the aid of the clocks, it is easy to see when it is advisable to decrease the number of operator-hours, and how long to postpone the increase in the number of operators.

During the tests in "Obro" there were made, besides the reading off of the *a*-clocks, frequent counts of different kinds: the main amperemeter of the central was read off every half hour, after which there were drawn current-curves, which provided a good means of comparison between the amount of service during different days and weeks.

Among the many tests which were made in "Obro," for two successive weeks, with nearly identical working, about 2,000 control calls were given from the main distributing frame. During the first week the aid-system was used, but not in the second. The accompanying drawing, Fig. 3, shows how the absence of the aid-system augmented the waiting time for the subscribers. During the first week there were about 5 per cent of waiting times above 11 seconds, against 10 per cent without the aid-system. This difference from 10 to 5 per cent, if it had to be reached by increasing the number of operators instead of using the aid-system should, according to calculations, equal an

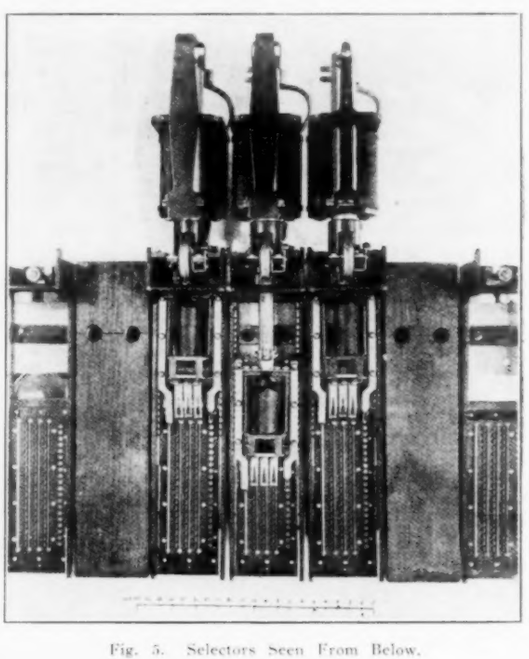


Fig. 5. Selectors Seen From Below.

increase of about 20 per cent in number of operators. Besides this more theoretical calculation, a practical proof of the advantages of the system was afforded, as it was very difficult to meet the impatience of the operators during the last week. They demanded either the aid-system re-opened or more operators to help do the work.

TECHNICAL DESCRIPTION OF THE AID-SYSTEM.

As will be seen from Fig. 1, there are at every position three transfer cords with appertaining three red lamps and four receiving cords, to which belong

*A is defined as a pure number, which denotes the fraction of the time the operator during which she is engaged in actual service. Thus 1—*a* denotes the fraction of her time during which she is disengaged.

four white lamps. (The last named cords are seen grasped with the hand.) Besides there belong to each receiving cord a listening-key and a green lamp to control the called subscriber. Since both key and lamp function are used exactly the same as the corresponding key and lamp of the cord-pairs, they will not be given further mention in this description.

Each of the transfer cords is connected with the contact-rail in an automatic selector. For 20 operator positions there are thus 60 automatic selectors, divided into 4 groups of 15 selectors each. The contact in the contact-multiples of the selectors are carried to the

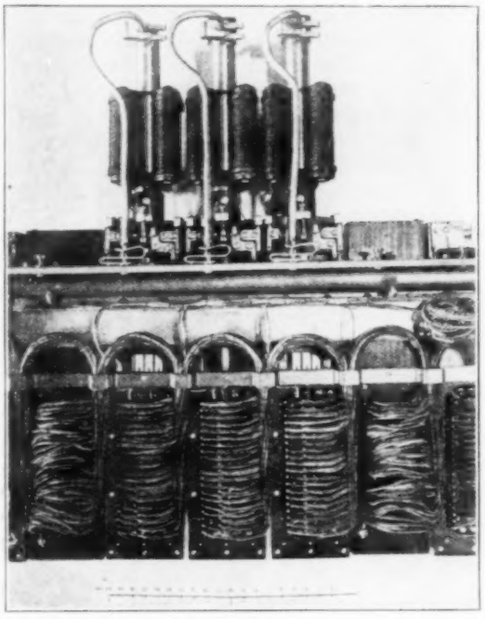


Fig. 6. Top View of Selectors.

call cords. Since each selector-multiple has 20 contacts (*i. e.*,, each selector has 20 contact-positions) the total number of multiple-contacts corresponds to $4 \times 20 = 80$ receiving cords, which are thus distributed over the same 20 operator positions.

In Fig. 4, which shows the aid-system in switchboard circuits, *1* is a subscriber's lamp, *2* is a subscriber's jack, *3* is a transfer cord, and *4* is the appertaining red lamp. The call cord is denoted by *5*, the accessory white lamp by *6*, and finally the listening key and the green lamp by *7* and *8*. In the center of the diagram drawing there is a sketch of the automatic selector used in Copenhagen, which is described below. The selector is run or started by means of the magnet *9*. The stopping on the disengaged contact is accomplished by the magnet *10* with the search-spring *11*.

The system works as follows:

When *1* is lit, the plug *3* is inserted in the jack *2*. When this is done the relays *12* and *13* attract their armatures and the magnet *9* is supplied with current, so that the selector is set in motion. The search-spring *11*, which moves over a series of contacts, selects one of these which is in connection with the ground (the battery's positive pole), and here the selector stops, while the magnet *10* is supplied with current. The two speaking wires in the plug *3* are now passed through the repeating-coil and selector to the plug *5*. While the relay *14* is working, the lamp *6* is lit beside the call cord; it is extinguished when the plug *5* is inserted in the multiple-jack. When the calling subscriber hangs up the receiver, the relay *12* will drop its armature and then the relay *14* again attracts its armature and lights the lamp *6*; while this means clearing-out, the plug *5* is taken out of the jack, the relay *15* drops its armature, and the magnet *9* in the selector is cut off from the current, after which the selector returns. Then the relay *13* with the transfer cord drops its armature, and the red lamp *4* is lit, after which the plug *3* is withdrawn.

It was mentioned above that the selector is stopped by the magnet *10*, while the search-spring *11* touches a contact in connection with the ground. This will be the case when the relays *14*, *15* and *16* are without current. The relays *14* and *15*, which belong to the call cord, will be without current when the receiving cord is not in use. The relay *16*, which belongs to the operator's position, will be without current when all listening-keys *7* are in a position of rest. (In the listening-key *7* there is only shown the contact spring which causes the position to appear engaged during operation, but no springs for the speaking and ringing circuits.) Thus it will be seen that the condition for a transferred subscriber to come into connection with a certain receiving cord is, in the first place, that this cord is not engaged, and, in the second place, that the operator at the position to which it is connected is disengaged; *i. e.*, that all listening keys in the position are at rest. When there is no operator at a position, it is "closed" by means of switch *17*.

COUNTING MESSAGES

In Copenhagen there is no exact count of the messages, and therefore in the aid-system there is no provision made in this respect. There is, however, nothing to prevent the messages from being counted in the usual manner, each receiving cord being furnished with a push-button, the same as with the other pairs of cords. In Fig. 4, the push-button on the receiving cord, and the position-counter *18* as well as the subscriber's message counter and a 5000 ohm relay *19*, belonging to the transfer cord, are indicated by dotted lines. The counting in this case takes place over one of the speaking wires, which will not cause any inconvenience, since the counting is done after the conversation is finished.

ELECTRO-PNEUMATIC SELECTOR

Christensen's selector, which is used in all aid-systems in Copenhagen, has, in contrast to most other selectors, a rectilinear movement. The motive power is compressed air of one atmosphere pressure per square centimeter. The contact-springs do not touch the stationary contacts in passing forward, but when a disengaged contact is selected, the movable springs are pressed by the air-pressure against the stationary contacts. Of course there is an exception to this rule with respect to the search-spring, which with a roller runs forward over the stationary contacts. The speed of movement is such that the 20 contacts are all searched in 0.6 seconds. Should, for the moment, all 20 contacts be engaged (which can seldom be the case), the selector goes back and forth until it finds a disengaged contact. Fig. 5 shows a few selectors seen from below. Fig. 6 is a top-view of the same. If a selector should get out of order, the running mechanism can very simply be exchanged in about 35

seconds. For producing the compressed air there is used a little motor-compressor with an automatic starting device. The consumption of air is about 0.2 liters of atmospheric air per selector per minute.

This selector has also been extensively used in Copenhagen independent of the aid-system. The use of the selector in the order wire service, for instance, has made it possible for every A-operator to use only one order wire key for every other exchange. When the key is pressed, the selector automatically connects the A-operator with a disengaged B-operator. Furthermore, the selectors are used for finding disengaged operators on recording positions in the toll line exchange, in the information office, and in the trouble office.

Ohio Independents Predict Mergers

That ultimate merger of the Bell and independent telephone interests of Ohio is coming, was stated in the district meeting of the Ohio Independent Telephone Association, held March 14 in Hotel Norval, Lima, and attended by 60 officers and stockholders of 40 independent companies in Allen, Auglaize, Hancock, Hardin, Mercer, Putnam, Paulding, Van Wert and Wyandot counties composing district No. 7.

Telephone men say that the long-distance business is destined for the Bell lines, while the city and other local fields are to be turned over to the independent companies. Mergers have already been consummated in Van Wert, Kenton and elsewhere.

The public utilities act, known as the Winters law, creating the public service commission, and specifying the conditions under which telephone companies may merge, was supported by the telphone companies themselves in their own interest and in the interest of the public.

Frank L. Beam of Mount Vernon, president of the Ohio Independent Telephone Association, in his address at the meeting, spoke upon this subject as well as the present legislative situation and the general state of the telephone business. The gathering was the largest and most successful yet held of the eight district meetings now being successfully held throughout the state. George H. Metheany, as vice-president for the Lima district was in the chair. The meeting began at 10:30 and lasted until 1 o'clock.

In the annual election, G. H. Metheany was again chosen as vice-president, and George W. Verner, Findlay, was made secretary. A district executive committee composed of one member from each of the nine counties was elected.

A proposal for city ownership and operation of a telephone system was adopted at a recent election in Seattle, Wash., by a vote of 32,498 to 18,163. Mayor-elect George F. Cotterill has expressed himself warmly in favor of a municipal telephone system.

Ohio Exclusive Contract Decision Affirmed

The affirmation of the Ohio supreme court of the decision of the circuit court of Van Wert county a year ago last October, is a determination of far reaching importance to the United States Telephone Company.

The supreme court in affirming the decision, which was rendered by Judge Alread, sustains all the contentions of the United States Company, and covers the principle involved in the case now pending in the circuit court of appeals of the United States, on the question of the validity of the exclusive contracts with local operating companies.

Under the decision affirmed, every contract made between the Bell Telephone Company, and an operating company with which the United States Telephone Company has an exclusive contract is void, and the local operating company is liable to an action compelling an account of any business sent over the Bell Telephone Company's lines, within the zone of service of the United States Company. It is possible that a contract and connection might be made between the Bell lines and such contracting companies, providing for the interchange of business to points not reached by the lines of the United States Company, but no such contract has ever been entered into or sought by the Bell Company. There has been a considerable loss of service to the United States Company, by reason of these prohibited contracts in the past several years, awaiting the final decision of the highest court of the state, which condition can now be repaired under this decision.

The suit pending in the United States court of appeals in which, as sought by the United States Company by a "flock-shot" to prevent the Bell companies from soliciting a violation of these contracts, or making connection with such companies as have contracts, has been continued from time to time awaiting this decision, on account of the same involving the interpretation of Sec. 9171, of the G. C., as the federal courts are generally controlled in their interpretation of a statute of a state by that adopted by the state courts.

However, whatever the judgment of the federal court might be, in that case, it would not prevent the prosecution of a suit for injunction against the offending party in the state courts.

Origin of the Names Telephone and Telegraph

In a recent issue of *Kosmos* the question is raised as to who was the first person to use the words "telephone" and "telegraph." It appears that the origin dates back considerably farther than one would naturally suppose; the word "telephone" was applied to a simple speaking tube devised in 1838, by Dr. Romershausen. The word "telephonium" was used as early as 1828 by Sudre for an acoustic telegraph, and Wheatstone used the word "telephone" in 1831, in speaking of the mechanical transmission of sound through wooden rods. But in point of fact the word dates back a great deal farther yet. Dr. Ulmer, in the Archives for the History of Science and Industry, mentions a pamphlet published in 1796 in Berlin by G. Huth, one of the closing sections of which deals with "the use of the speaking tube for telegraphy." Huth is treating of what in his day was a great invention, namely, Chappe's optical signaling, which "he proposes to improve by posting at intervals men with huge megaphones, who are to receive and transmit the message in relay fashion, by simply speaking through their megaphones." This method of telegraphing thus was acoustic in character instead of optical, as in the case of Chappe. "This distinction," says G. Huth, "seems to demand a special name for the method of telegraphing by means of speaking tubes." What name should be better fitted than the word of Greek origin, telephone?"

What One Woman Thinks

By Sarah Elizabeth Brown

I'M SICK, awfully sick—of winter. I don't remember a time when I was so anxious to take 'em off and get into my summery things. Never before did last year's stuff look so good to me, and at an old-fashioned quilting bee that us women had at Lucretia Boggs' last week, we held to this opinion in one grand chorus. I know now why Obediah went fishing. As I grow to know my old man—and a married woman must learn by constant association—I'm thinking he's as smart as the average. And when winter doesn't have any better sense of appreciation than to stick around like it is doing this year, I'll join the next fishing expedition myself. I'll send this batch of copy with my fond hope that the snow will be gone by the time you print it.

* * *

The newspaper paragraphers are having a high old time with "You gotta quit kickin' my dog aroun'." To me the funniest thing a dog does is his performance with an old rag. We all have our old rag dogs and their antics. The old rag in the independent telephone business is the U. S. I.—United States Independent Telephone Company. I thought that the dog had buried it with his meanest bone, but I am mistaken. The U. S. I. is back again—this time in the Court of Chancery at Newark, N. J., Jay Ten Eyck sitting as special master. I have dragged this old dog rag around a bit myself, and have tried to hide it, but it won't stay put. According to newspaper reports, a certain William F. Dwyer has testified that Thomas W. Finucane of Rochester, once upon a time paid $5,000 in real money for fifty shares of full-paid and non-assessible stock of the Mercantile Electric Company, par $100. These shares were the foundation of the $50,000,000 U. S. I. Mr. Dwyer is a self-confessed dummy director in the New York Independent Telephone Company which acquired the Mercantile stock, paying therefore, $41,000,000 par value with its stock. A copy of a receipt for three certificates signed by Thomas W. Finucane, was put in evidence by Elbridge L. Adams of New York. One of the certificates represented $26,000,000; another $13,000,000 and another $2,000,000. Other exhibits showed that the New York company transferred $39,000,000 of its stock to the U. S. I., receiving for it $38,597,500 par value of U. S. I. stock and $1,278,000 par value, thirty-year five per cent collateral trust gold bonds of the same concern. These facts are dragged into the lime kiln because claims aggregating $2,048,172 have been filed against the U. S. I. by people who want their money. No tangible assets have been found and it will be the problem of the court to determine whether the stockholders may not be held accountable to the creditors. According to a will filed by James M. E. O'Grady, a stockholder and creditor, among the men back of U. S. I. are these: Thomas W. Finucane, Rochester; William J. (Fingey) Conners, Buffalo; George Eastman, Rochester; Adolphus Busch and Breckenridge Jones, St. Louis; Wm. H. Page, Jr., New York; Robert C. Hall, Pittsburg. These names have the ring of money, but they don't stand very high in the list of telephone men. The U. S. I. went into bankruptcy in 1909 and creditors have found favor in every court they have tackled since that time.

It is unfortunate that we have had examples like the U. S. I. They have wrought untold injury. Too bad that they won't die, but nobody wants to seek a quarrel with those who have aggregate claims against a bankrupt to the amount of two million dollars. Independents have shown unswerving fidelity to a principle. It has made them great. None of us will forget that the independent telephone movement was born of economic necessity. To this principle the industry owes its magnificent support. Harm has come to it by the greed of a coterie of self-seeking promotors who have posed as the unterrified independents, but whose actions have brought nothing but reproach. In a business of such immense proportions, it is not remarkable that the industrial adventurer came along, but the U. S. I. is such a brazen affair, now that the mask is off, we wonder why it might not have been brought to earth earlier in the game.

* * *

In dropping the subject of U. S. I., it should be pardoned if I speak of the U. S. Tel. Co. of Ohio. The U. S. Tel. has eight subsidiaries, including the companies at Massilon, Youngstown, Zanesville, Lancaster and Findley, and the Stark and Columbiana County and Citizens Telephone and Message Company of Fostoria. All these companies made money last year without the addition of new capital. The development has gone forward, but it has all come out of surplus earnings. The balance sheet of the United States Telephone Company, representing a plant investment of more than $5,000,000 is satisfactory in every sense. Cuyahoga at Cleveland also makes the best showing in its history with net earnings of $273,225. The bonds of U. S. Tel. are selling at 82, due in less than seven years. At the market they return the investor 9 per cent. Cuyahoga 5's due in six years, nine months, are selling at 87½ and on the basis of present market, insure an income of 7½ per cent. With showings like this the telephone security market will upset any prejudice that might exist.

* * *

The Inter-State Tel. & Tel. Company, headquarters Aurora, earned for the year ending October 31, 1911, $154,130 net. After deducting from this amount the interest on outstanding bonds, taxes, etc., $27,893 remained as surplus. And this is one of the companies that couldn't be wrecked! The Inter-State has authorized $50,000,000 of bonds, but there are outstanding $2,384,000. It is alleged that $1,700,000 of these bonds are in the hands of "unfriendly interests" whatever that means.

* * *

The Sunset got the Home at Tacoma, in spite of all the back talk. Here was an independent loss, for the Home cost $2,000,000 and the Sunset picked it up for $550,000. The shareholders didn't get a cent. The bond-holders got twenty-nine cents. The receiver got $200 a month for nineteen months and the court

slipped him $10,000 as evidence of good faith and loyalty.

San Francisco and Omaha have joined the "also rans." I wonder what we are coming to?

Oakland and Berkeley—San Francisco suburbs—are anxious to get into the telephone business. The politicians out there are not interested in the national campaign, evidently. When the towns want to go into the telephone business, I'm going into the brokerage business—telephones, of course.

* * *

The Chicago Telephone Company increased its gross earnings last year by $1,347,237. The increase in the number of telephones was 35,034. Chicago papers, some of them, refer to these figures as slight gains. Nothing better could be offered to a feeble old woman to emphasize how big things pale to little things in the Windy City. Only a gain of 3,000 telephones a month. Or a hundred a day! Mere bagatelle. And the dear old town slipped in another million and a third as a small talk item. Ain't it awful, Lucretia? Referring to these slight gains, Mr. Sunny says that the profits will be less to the city, because so many of the added telephones were of the nickel a day kind. He opines that this particular equipment returns only $22.70 per annum, whereas one city expert has figured that it costs the company $28.64 a year to operate and another city expert says it costs $25.28. Say, won't old Ed Bemis or somebody else tell me what it costs to operate our north line with eight subscribers? We get $1.50 a month and supposing we don't know, don't you think an expert ought to tell us? Doggone, I do wish I could figure! But if Mr. Sunny doesn't have to, I ought not get all het up about it, after all. Suppose us operators should lose some money on some of the service as a penalty for being in the business. I am not thinking of the lost calls, either.

* * *

This is the year that I'll say very little about the "Report of the Directors of the American Telephone & Telegraph Company." They have put the kibosh on me by carelessly referring to an item in this manner: "The total capitalization, including inter-company items and duplications, of the companies of the Bell system is $1,186,639,036." No, there is no mistake about the figure. That is the way it is set down. And what is more I am totally unfit to juggle with a billion, plus. I like to roll the word million around in my mouth. It has a good feel. But when you multiply it by a thousand it gets billious, that's all. There is an item that listens good to me, though, and that is the gross revenue—the income collected from the public who seem to do nearly all their talking over the telephone. The Bell people got in over their own lines, $179,500,000—an increase of $14,000,000 over the previous year. And think of it, the year 1911 at that! The report shows that of this big revenue, $60,000,000 went to operation; $9,000,000 to taxes; $30,200,000 to current maintenance and $28,700,000 to depreciation. This left $1,600,000 available for surplus charges.

Every time I get hold of this report I marvel at the bigness of this country and the possibilities it offers to its people. Here is one telephone system, getting larger and larger and larger. And the same thing can be said by many other smaller operators who are finding their systems showing similar tendencies.

Just to change the subject, I wonder if the city folks have any idea how the country folks have suffered this long, hard winter. The cold has been almost intolerable. The old Round Oaks have lapped up cord after cord of stove wood and the warming pans and hot water bottles have failed utterly in their efforts to ward off frost bite. The old underground pipe that has led the water from the windpump to the stock tank, froze up long ago and the temporary pipe that was laid along the surface to perform the same function has been a continual bother. The roads have become intolerable with the few thaws we've had. The live stock have shaggy coats, unkempt because—oh, well, why curry 'em? The chickens have been standing around on one frozen foot at a time for so long it will be surprising if the chicks won't be one-legged. It has been thaw out this and that for so long I wonder will it ever end. Winter wheat in our section of the country is frozen out and the sexton at the cemetery says the ground is solid for thirty-eight inches and he's the only man who knows. When we could get out to a party we huddled up in bunches and stayed and stayed. The next day we crawled out of bed about ten and began thawing things out for breakfast. And so it has been going for ever so long. You city people with your steam heated flats—oh, how I've envied you. Don't think the farm is so lad-de-dah in the good old winter time.

* * *

Postmaster-General Hitchcock got a nice little slap on the wrist for his break that Uncle Sam should go into the telephone business, didn't he? And it begins to look like that big honey bunch of a president of ours would get a nice punch next November for having such fellows as Mr. Hitchcock around. Well, you know my opinion of politics. I'm the suffering suffraget who wishes to cast only one vote once. I vote for Spring.

E. H. Martin Explains His Telephone Meter

E. H. Martin, of Webster City, Ia., well known in independent telephone circles, has devised and is about to market a new type of telephone meter.

The justice and consistency of selling water, gas and electricity by meter measurement has been recognized for years, and is proved by the fact that each consumer must pay for what he actually uses as measured, and there is no reason why the poor man should pay for the extravagance of his neighbor. If this is true of water, gas and electricity, why not the telephone, asks Martin.

The meter itself is a 16-size 7-jeweled watch movement that counts minutes up to 9,999, and is mounted in the telephone receiver. In order to attach it to a telephone (any make or system) it is only necessary to take off the present receiver and connect the new one in its place. When you place the receiver to your ear you cannot hear anything (being cut off the line) until you push a button mounted on the receiver. When you push this button you do three things, first, wind it; second, start it, and third, cut yourself on the line. There is a set screw in the meter which will set it anywhere from three minutes up to ten minutes, when it will cut you off the line, and if you wish to talk longer you have to let go of the button and push it again. For instance, if the meter is set to three minutes you have automatic notice that you have talked your limit on toll lines.

Pole Line Hardware Specifications

Standards for Purchasers

WITH the increasing competition in the manufacture and sale of pole line hardware, and the consequent effort to make prices as low as possible, there has been evident a natural tendency to depart from certain standards of size and material. These standards, while more or less vague in the practice of many telephone companies, have been reduced to a definite basis and embodied in specifications which have been found highly economical and satisfactory. These specifications, which we reproduce here, have been used for several years by a large operating company.

Besides the specifications in full, the drawings accompanying it are reproduced to a scale of 6 inches to the foot, or half actual size. As stated, however, figures upon the drawings should be followed in preference to scale measurements. Not all the details specified in the text are shown on the drawings, and some of the descriptions annexed to the drawings may be omitted from the text; but it is the purpose of the two to supplement each other, and anything indicated in either one must be regarded as a part of the specifications.

It will be noted in the opening paragraphs that the manufacturer is made responsible for his product, not only in its adherence to the provisions of the specifications but also as to perfection of material and workmanship. Approval of the shipment by inspector does not, therefore, absolve the manufacturer from the duty of making good any defects discovered after acceptance by the company.

The specifications and drawings follow:

SPECIFICATIONS FOR POLE LINE HARDWARE.

The quality of the materials used and the methods of manufacture shall be such as to insure for the completed hardware the properties and finish called for in these specifications. The manufacturer must make sure that all material and work is in accordance with the specifications before the hardware is delivered. The telephone company is to have the right to make such inspections and tests as it may desire of the materials and of the hardware at any stage of the manufacture. The inspector of the telephone company shall have the power to reject any material or hardware which is defective in any respect. Inspection shall not, however, relieve the manufacturer from the obligation of furnishing perfect material and sound, reliable work.

Any imperfect material or unfaithful work that may be discovered before the final acceptance of the completed hardware shall be corrected immediately upon the requirement of the telephone company, notwithstanding that it may have been overlooked by the inspector. If the requirements of these specifications are not fulfilled when the hardware is offered for final acceptance, not only shall the telephone company have the right to reject the hardware, but the expense of inspection and test of such defective hardware shall be borne by the manufacturer.

General. The drawings and specifications are intended to include all instructions necessary for the manufacturer to guide him in his work. They are intended to co-operate with and supplement each other, so that any details indicated in one and not in the other shall be executed the same as if indicated in both.

Figures upon the drawings shall be followed in preference to scale measurements.

All material and workmanship, unless otherwise specified herein, shall be of the best grade.

Either rolled thread or cut thread bolts may be furnished where both kinds are shown in detail.

Guy rods may have either a cut or rolled thread.

Either style of drive screw may be furnished.

Either the standard or the rolled steel guy clamps may be furnished.

Dimensions. The dimensions and style of the various articles of pole line hardware shall be as shown in the drawings, the numbers of which are given in the accompanying table.

Rolled Thread Crossarm Bolt	Drawing No. 1
Standard Crossarm Bolt	Drawing No. 2
Standard and Rolled Thread Carriage Bolts	Drawing No. 3
Standard Rock Guy Bolt	Drawing No. 5
Standard Staple	Drawing No. 6
Standard Round Washer	Drawing No. 7
Standard Square Washer	Drawing No. 8
Standard Thimble	Drawing No. 9
Standard Twist Drive Screw	Drawing No. 10
Standard Fetter Drive Screw	Drawing No. 11
Standard Crossarm Brace	Drawing No. 12
Standard Pole Step	Drawing No. 13
Standard Guy Rod	Drawing No. 14
Standard Guy Clamp	Drawing No. 15
Rolled Steel Guy Clamp	Drawing No. 16
Extension Fixtures Braces	Drawing No. 17
Back Brace	Drawing No. 18

The end of the crossarm bolt, carriage bolt, rock guy bolt and the ends of the bolts of the guy clamp shall be rounded or slightly tapered.

The thimble shall be furnished open so as to take a five-eighths (⅝) inch rod.

In the guy clamp, special care shall be taken to have the longitudinal curve of the grooves the same in both parts of the clamp.

Material. The quality of all iron and steel used in the construction of pole line hardware shall conform to the standard specifications adopted by bridge builders, *unless otherwise specified.

The crossarm bolt, carriage bolt, round washer, square washer, pole step, fetter drive screw, twist drive screw, guy rod and thimble shall be made of iron or mild steel, galvanized.

Rock Guy Bolt. The eye bolt shall be made of the best quality of commercial rectangular bar wrought and malleable iron, galvanized. The bolt shall be made of steel, galvanized, and shall have a breaking strength of not less than 60,000 pounds per square inch.

Guy Rods. The welded joints shall be of the best workmanship, thoroughly welded without being overheated.

Staple. The staple shall be made of steel wire, galvanized.

Standard Guy Clamp. The guy clamp shall be made of the best quality of malleable iron, galvanized. The castings shall be smooth and free from imperfections. The bolts shall be made of steel, galvanized, and shall have a breaking strength of not less than 80,000 pounds per square inch.

Rolled Steel Guy Clamps. The sides shall be made of steel, galvanized. The bolts shall be made of steel, galvanized, and shall have a breaking strength of not less than 80,000 pounds per square inch.

Crossarm Brace. The crossarm brace shall be of iron or low carbon steel, galvanized.

Extension Fixture Braces. Extension fixture braces shall be made of iron or mild steel, galvanized.

One diagonal brace shall be provided for each fixture.

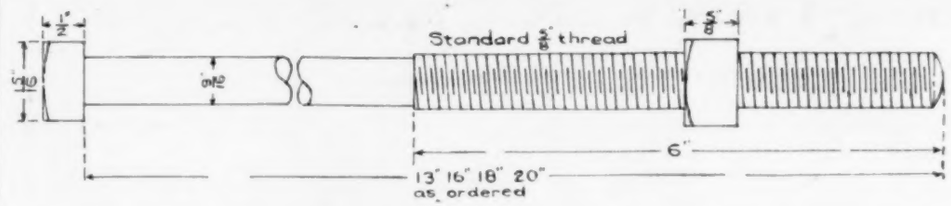
The back braces shall be furnished in either length as ordered. There shall be one (1) back brace for each crossarm of the fixture.

One (1) bolt four and one-half (4½) inches long and one-half (½) inch in diameter shall be furnished with each back brace. They shall be made of iron, and galvanized.

Back Braces. Back braces shall be made of mild steel, galvanized. Each brace shall be furnished with four (4) galvanized iron machine bolts four and one-half (4½) inches long and one-half (½) inch in diameter.

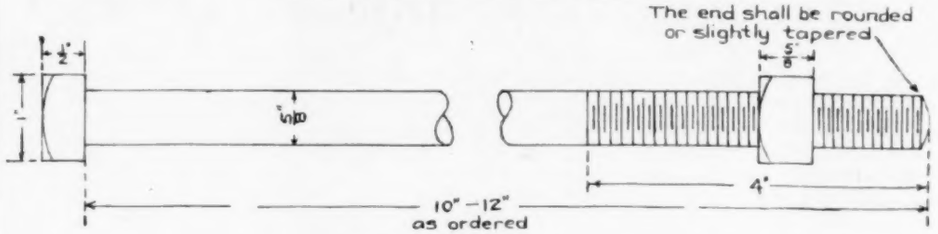
Galvanizing. All galvanizing, with the exception of the threaded portion of the twist screws, shall be in accordance with the American Telephone and Telegraph Company's specifications for galvanizing for iron and steel. All threads shall be galvan-

*Note—Specifications for constructional iron, meeting the desired requirements, may be found in the current handbook of the Carnegie Steel Company, Limited.



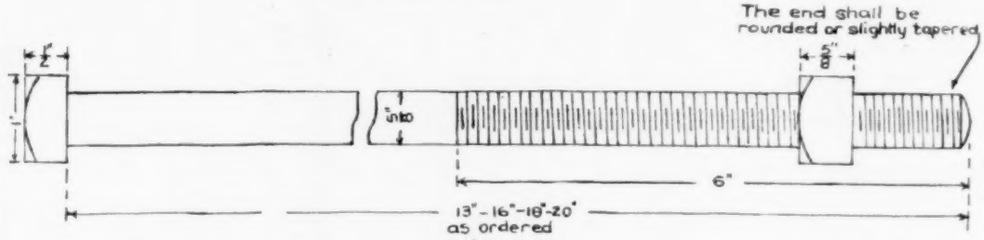
Drawing No. 1. Rolled Thread Cross Arm Bolt, Assembly. Half Size.

Made of Iron or Mild Steel, Galvanized



Drawing No. 2. Standard Cross Arm Bolt. Half Size.

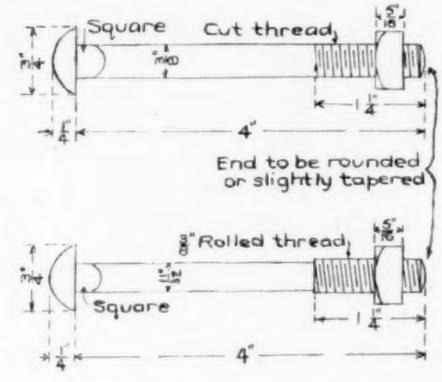
Iron-Galvanized



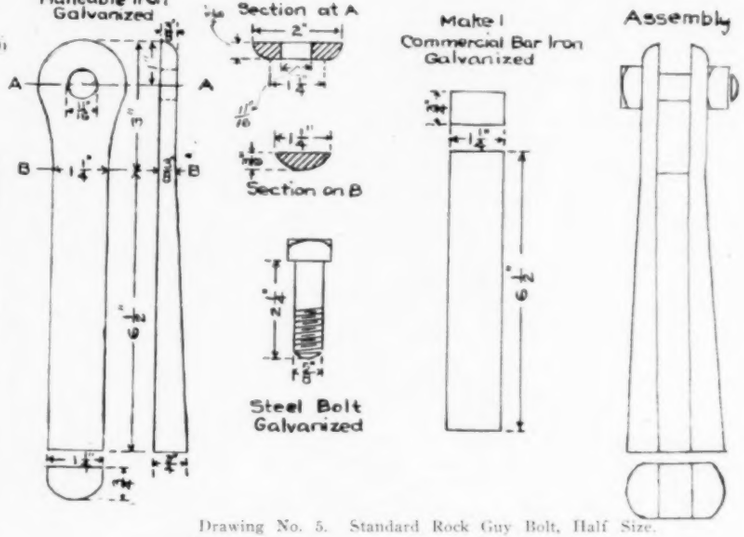
Iron Galvanized

Drawing No. 3. Standard Cross Arm Bolt. Half Size.

To be made of iron or mild steel, galvanized
Dimensions not less than shown

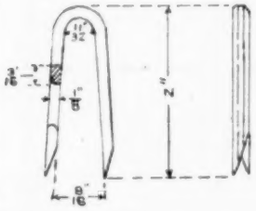


Drawing No. 4. Carriage Bolt, Half Size.



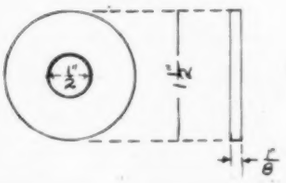
Drawing No. 5. Standard Rock Guy Bolt, Half Size.

Galvanized Steel Wire

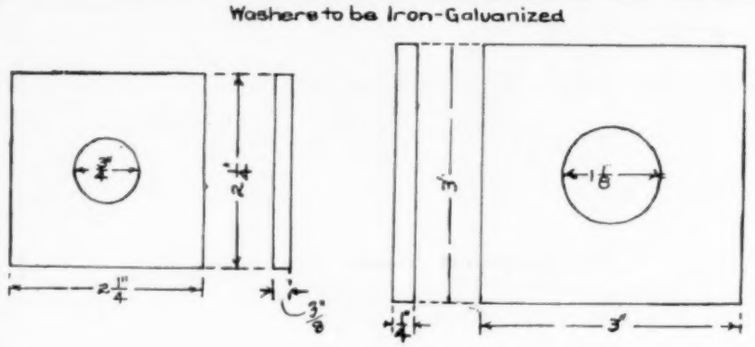


Drawing No. 6. Staple. Half Size.

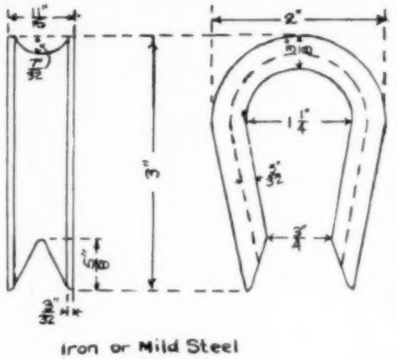
Iron Galvanized.



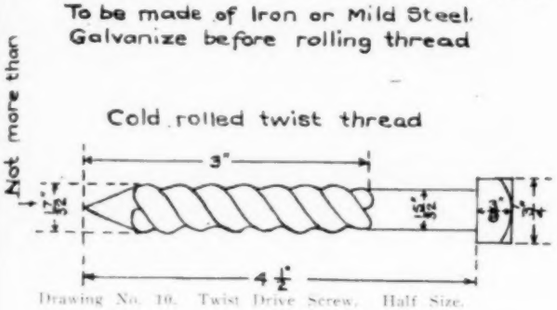
Drawing No. 7. Standard Round Washer. Half Size.



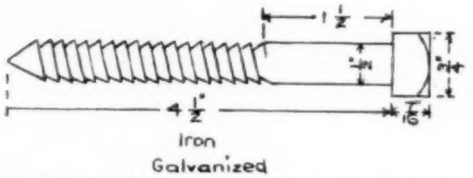
Drawing No. 8. Standard Square Washers. Half Size.



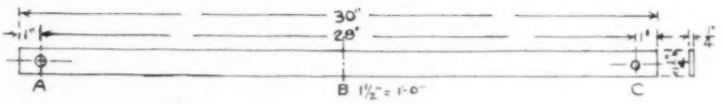
Drawing No. 9. Thimble Half Size.



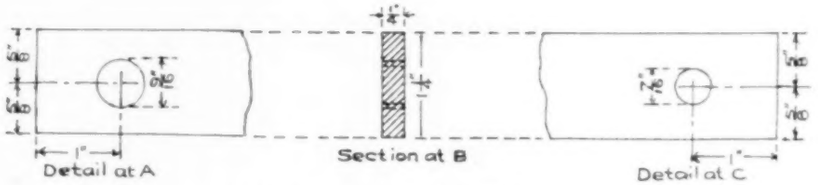
Drawing No. 10. Twist Drive Screw. Half Size.



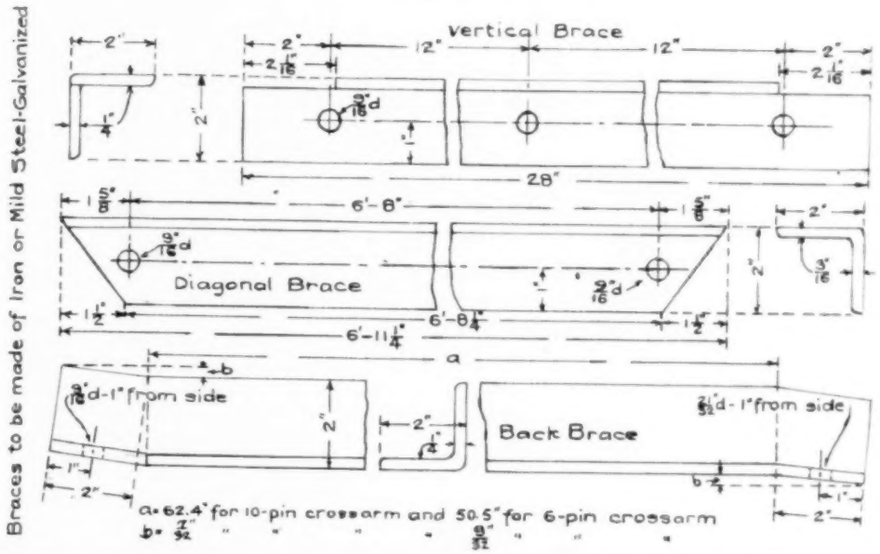
Drawing No. 11. Fetter Drive Screw. Half Size.

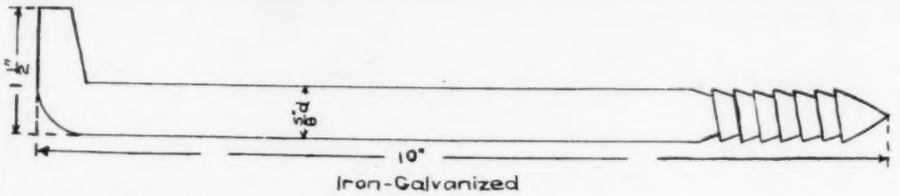


Drawing No. 12. Standard 30-inch Cross Arm Brace. Half Size.

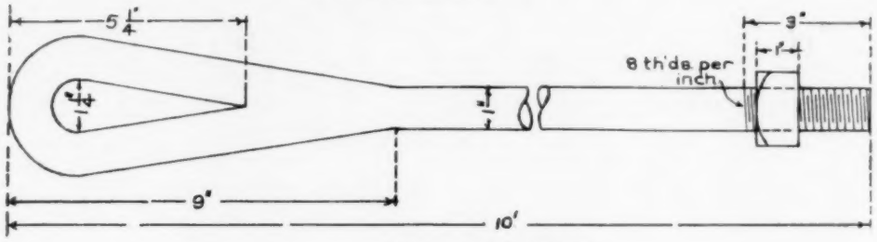


Drawing No. 13. Extension Fixture Details. Half Size.

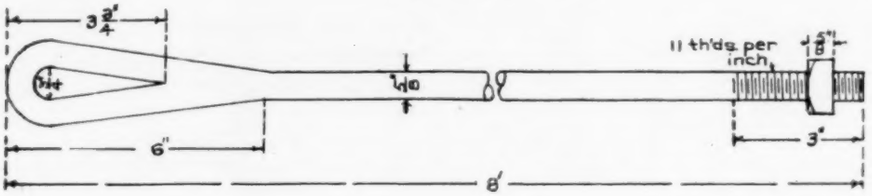


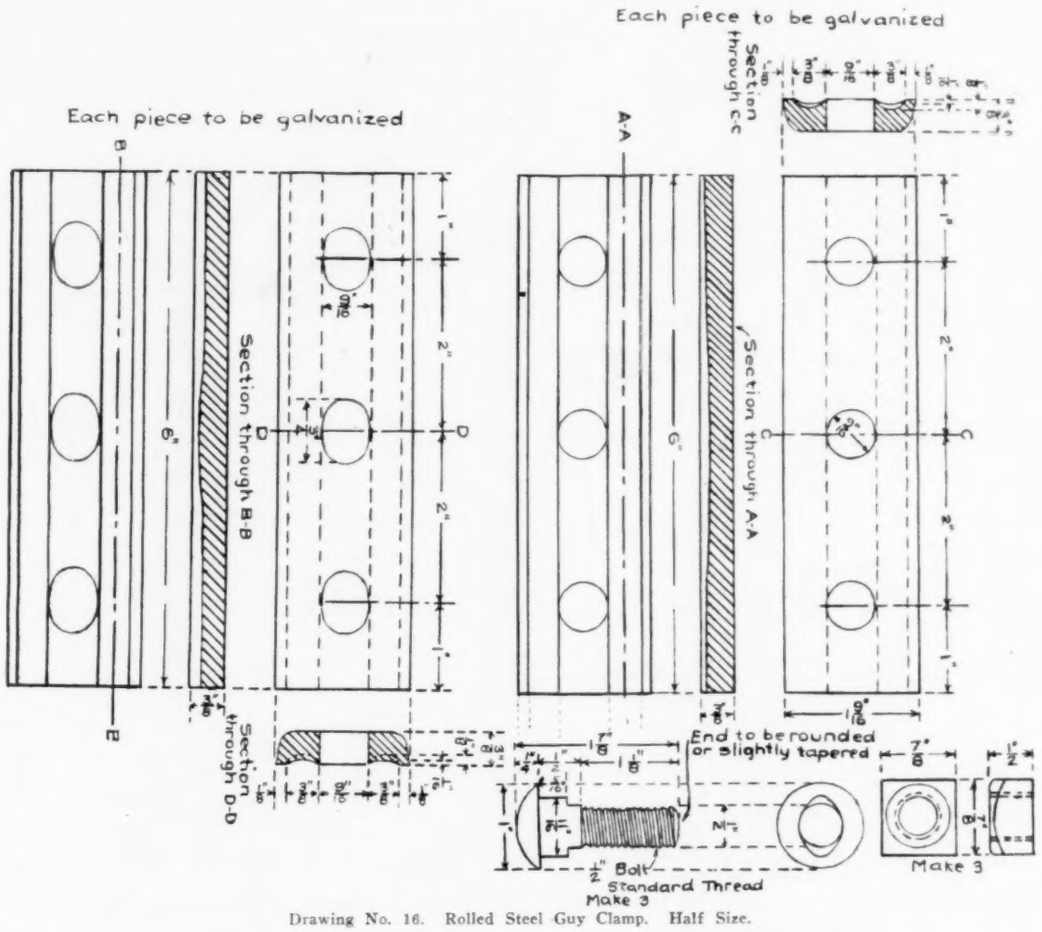


Drawing No. 13. Iron Pole Step. Half Size.

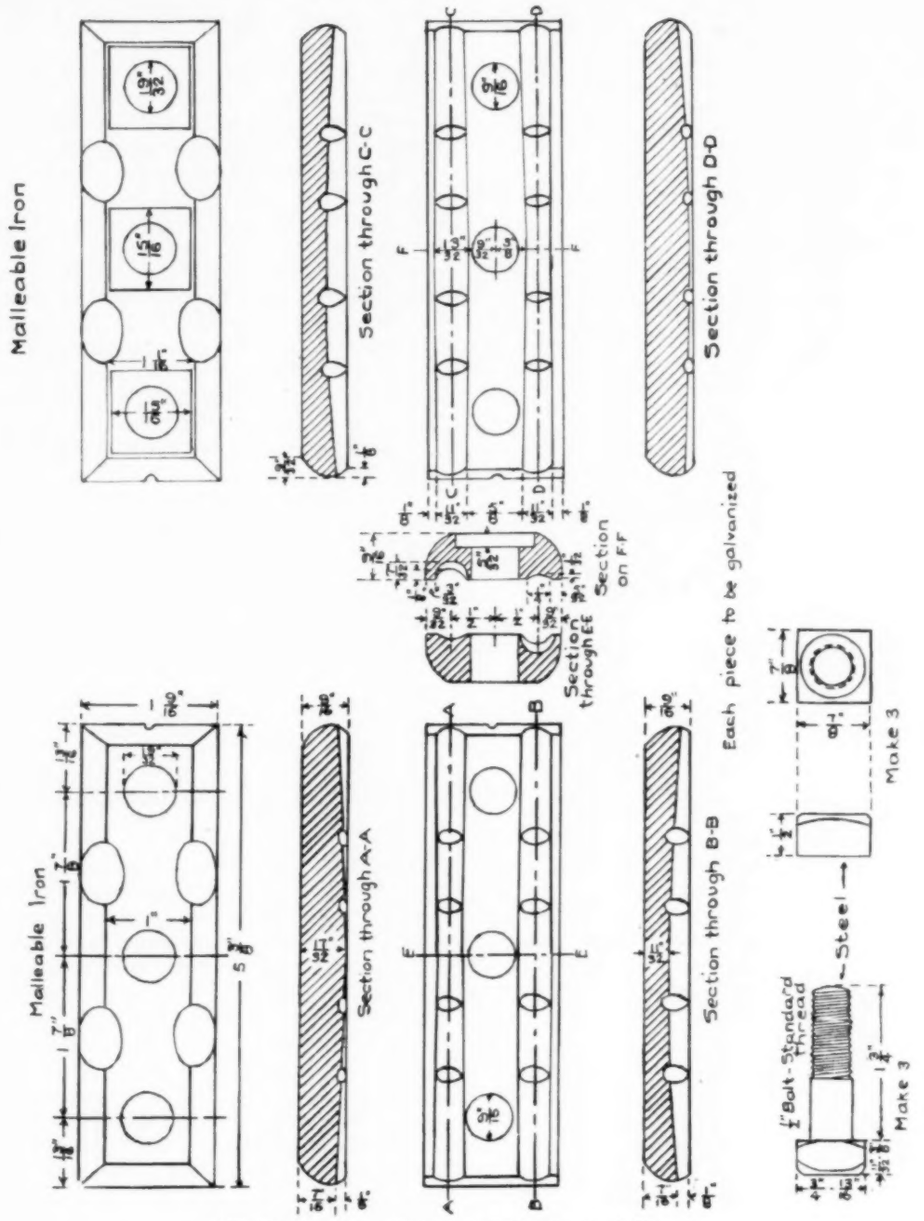


Drawing No. 14. Standard Galvanized Iron Guy Rods. Half Size.

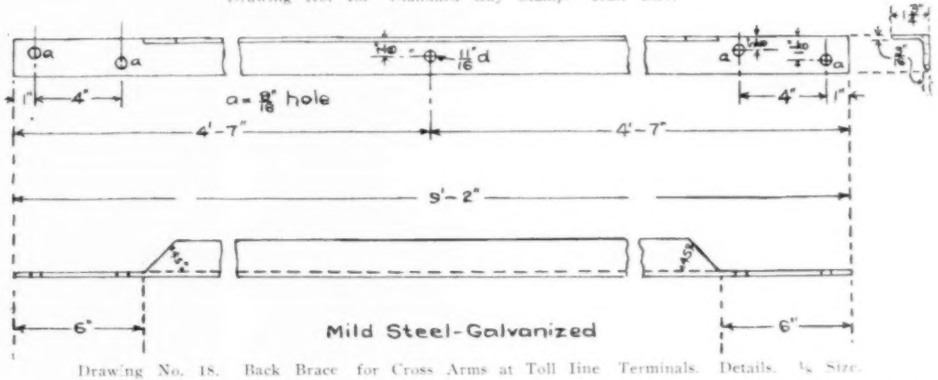




Drawing No. 16. Rolled Steel Guy Clamp. Half Size.



Drawing No. 15. Standard Guy Clamp. Half Size.



Drawing No. 18. Back Brace for Cross Arms at Toll line Terminals. Details. ¼ Size.

ized. The following method is satisfactory for cut threads:

The threads shall first be cut with a small die, then galvanized, and finally recut with a die of standard size, which shall leave on the threads a coating of zinc conforming in all respects with said specifications for galvanizing for iron and steel.

The entire twist drive screw blanks shall be galvanized and then the thread rolled, leaving a standard coating of zinc on all parts of the drive screw except the thread.

Drawings and Specifications. The following specifications and drawings form a portion of these specifications.

SPECIFICATIONS FOR GALVANIZING FOR IRON AND STEEL.

Drawing No. 1.....Rolled Thread Crossarm Bolt
Drawing No. 2.....Standard Crossarm Bolt
Drawing No. 3.....Standard Crossarm Bolt
Drawing No. 4.....Standard and Rolled Thread Carriage Bolt
Drawing No. 5.....Standard Rock Guy Bolt
Drawing No. 6.....Standard Staple
Drawing No. 7.....Standard Round Washer
Drawing No. 8.....Standard Square Washer
Drawing No. 9.....Standard Thimble
Drawing No. 10.....Twist Drive Screw
Drawing No. 11.....Standard Fetter Drive Screw
Drawing No. 12.....Standard Crossarm Brace
Drawing No. 13.....Standard Pole Step
Drawing No. 14.....Standard Guy Rod
Drawing No. 15.....Standard Guy Clamp
Drawing No. 16.....Rolled Steel Guy Clamp
Drawing No. 17.....Extension Fixture Braces
Drawing No. 18.....Back Brace

New York Commission News

The New York Public Service Commission, second district, has received a petition 226 feet in length, signed by 4,160 persons, asking the commission to use its influence to induce the New York Telephone Company to make reasonable terms for the retention of public telephones in drug stores. The petition recites that since the earliest introduction of public telephones, drug stores, from their environments, location, territorial distribution and accessibility at all hours of every day in the year, have been the most convenient and popular location for public telephones. The New York Telephone Company has recently put into effect a regulation allowing druggists only 10 per cent of the receipts from coin slot instruments. Formerly the allowance was 20 per cent and upwards. The petition filed with the commission was started in New York and circulated through the state, the final signatures coming from Buffalo.

The commission has received from the board of trustees of the Park Central Presbyterian Society of Syracuse a complaint against the advance in rates for telephone service of the New York Telephone Company in its church. The complaint alleges that the rental price was raised from $30 to $48 per year, making it the same rate as for a busjness house, and protests against this classification. The complaint has been served and an answer required within twenty days.

Aluminum Not Good for Telephone Wire

A bulletin of the National Electric Light Association, New York, contains a discussion of the conductivity, tensile strength and other properties of aluminum wire. Some of the physical constants of aluminum as it is now manufactured commercially for electrical purposes are as follows: Melting point, 1,157 degree F.; elastic limit, 14,000 pounds per square inch; ultimate strength, 26,000 pounds per square inch; modulus of elasticity, 9,000,000; electrical conductivity, 62 per cent; specific gravity, 2.68; coefficient of linear expansion, .000,012.8. At present aluminum is used only to a limited extent for large conductors. Its use is thus restricted because of the practical impossibility of employing the ordinary methods of soldering, due probably to the fact that its surface seems to have a coating of oxide on it at all times.

At the present relative cost of the two metals, aluminum is ten to fifteen per cent cheaper than copper of the same resistance. The weight of a unit length of aluminum wire is only 47 per cent of a copper wire of the same length and resistance. Consequently, aluminum can cost 2.13 times as much as copper per pound and still cost the same as copper per unit length from the standpoint of electrical resistance. As a matter of fact, however, the price of aluminum at present is less than 2.13 times that of copper per pound, so that it is actually cheaper to use aluminum as an electrical conductor than copper, where other considerations do not enter. At present, however, the aluminum market is so centralized under one common control that there is no market for aluminum junk, and this feature makes it impossible for operating companies to figure that aluminum has any junk value.

Expansion and contraction with changes in temperature is greater than in copper. A solid wire of small size gives a great deal of trouble through breakage due to crystallization of the wire from swaying in the winter. The greater expansion and contraction make it necessary to be especially careful to avoid stringing lines too tight in warm weather. The increased sag necessary for aluminum makes the liability to crosses unduly high. Joints between copper and aluminum wire give a great deal of trouble due to electrolytic action.

New Hampshire College Discusses Telephones

At the second meting of the New Hampshire College branch of the A. I. E. E., P. F. Goodrum, chief equipment man of the American Telephone and Telegraph Company, Boston, gave a lecture on "The Telephone." As an introduction the speaker pointed out the superiority of the telephone over the railroad as an annihilator of distance and explained the chief difficulties (leakage, resistance, inductance and capacity) encountered in long distance transmission, as well as the methods and appliances at present used to eliminate each one. Mr. Goodrum discussed the problem constantly before the telephone engineer as to how much expense should be permitted in the system, since a large outlay would cause a high toll rate, whereas a small outlay would cause poor service. As an example of the work involved in installing an underground cable system Mr. Goodrum spoke of the one at present under construction between Boston and Washington. Views taken during the construction of the portion between Providence and New Haven were thrown on the screen. The results of a sleet storm were illustrated by photographs taken during the winter of 1909 when the American Telephone and Telegraph Company suffered heavily from interference with the telephone traffic. Early and present telephone exchanges, the process of connecting one subscriber with another, as well as simplex, composite and phantom circuits, were considered by the speaker. Insulators, wires, cables, drops, plugs, jacks and other equipment used in telephone traffic were explained and were open to inspection at the close of the lecture.

Problems of Telephone Rate Making

By Alonzo Burt*

A TELEPHONE company does not furnish any commodity to the public, nor does it transmit messages. Its functions are to provide, upon request of its customers, apparatus and circuits so arranged as to establish a complete electrical connection between two point, and the persons desiring to communicate then undertake to transmit their own messages. This has come to be known generally as furnishing telephone service, which is the only public service in which there is any interdependence between users of the service. Each customer of a water, gas or street railway company makes such use of these commodities as may be required, but each customer uses the service without any relation to any other customer. This interdependence of telephone service is a large factor in the operation of a telephone system, as subscribers to one class of service call all other classes, this interdependent intercourse being constant day after day, but never twice exactly alike. The quantity of service that will answer the needs of one customer may not meet the requirements of another, yet these two may frequently communicate with each other, and although each may have a class of service different from the other, all of the classifications must be such as will reasonably meet all requirements at rates that are individually fair and reasonable, considering the service rendered. Therefore, this interchange of service, or interdependence of subscribers upon each other very greatly complicates a telephone rate schedule with respect to finding the definite cost of any particular class of service.

The cost of providing telephone service is a fundamental element in rate making, but it is by no means a controlling factor in the preparation of a schedule for exchange service that will give a range of rates that is necessary to offer in order to meet the requirements of the public and to secure a large list of customers.

Several different rates are usually offered the public. A difference is made between business and residence service. This difference in rates favorable to residences is made probably because it is impossible to get as much for residence as for business service. The difference in cost of furnishing the service is by no means as great as the difference which it is necessary to make between business and residence rates. One and two, and possibly four-party service is offered because only a small portion of subscribers will pay for single line service, and in order to get a good development there must be a graduated scale, such as can be furnished by means of both single and party lines. All over the country the same general result in rate making seems to have been reached by both independent and Bell managers, in that the larger exchange must carry a higher rate than the smaller one, and that in small cities and towns it is found that all should pay about the same rate without regard to population, there being a point below which profitable rates cannot be made; also that instead of trying to ascertain whether or not each and every town is equally profitable, or whether every rate charged is a profitable rate of itself. It has been found necessary to deal with the average results of the business as a whole, for the reason that the figures of the whole business must be considered before the profit or loss can be determined.

It is generally conceded that telephone service is of value to the user in proportion to the number of persons available through its use. It is, therefore, essential to the success of the business that the greatest possible number of subscribers be secured. In order to induce the patronage of small tradesmen and others whose use of the service is naturally limited, a low rate must be offered. This rate should ordinarily not be fixed at a point so low as to cause a loss to the company, although it may be so low as to produce little or no profit. Through the use of a very low rate to attract a large number of patrons whose originating service may be small, a wide range of possible use is secured for the patrons whose originating use may be large, or who may profit largely by having many who can communicate with them, and for this wider possible use the larger user should pay a higher rate of profit than is paid by the small user.

The city of Chicago is now engaged in making an investigation of the rates charged by the Chicago Telephone Company for service within the Chicago city limits. Professor William J. Hagenah, one of the experts employed to make an examination into the business of the Chicago company, submitted a report some months ago, including a proposed rate schedule, for consideration by the City Council Committee in charge of the investigation, in which he said:

> The immediate purpose of every schedule of rates is to secure a sufficient amount of revenue to enable the company to furnish the most efficient character of service under the conditions prevailing in its field of operation, but no less important is the requirement that the rates shall be uniform in their application and designed to work substantial justice to all classes of subscribers. To be just and uniform such schedule should follow, in so far as possible, the curve showing the cost of supplying service of the character in question, but strict adherence to this rule would defeat the widest use of the telephone by denying to certain classes of people the benefits of such service, and thereby make telephone service less valuable for all classes of subscribers.
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> The factors which make telephone service valuable are the efficiency of the service and the number of subscribers which may be reached by it. Any step which results in increased efficiency and in the extension of the service to the largest possible number of persons adds to the value of the service of every subscriber. In every city there are a large number of persons whose use of the telephone is so limited that unless some concession below the line of absolute cost is made, the rates to them will be prohibitive. To secure the widest possible installation of service, even though in some classes the rate may be somewhat below the actual cost of service, adds greatly to the value of the service to those whose use of the instrument is more extensive, such as commercial and professional classes. If by such installation, value is added to the service for all classes, the nearer approach to the point of saturation of the territory served will compensate for some departure from the absolute cost. * * *
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> Where the value of the service justifies a rate lower than the absolute cost, such a rate is not necessarily discriminatory. In fact the failure to make such concessions may

*Address delivered before the Wisconsin State Telephone Association at Madison, Wis., February 15, 1912.

cause other rates to be discriminatory and unreasonably high. A rate for any class of telephone service can not always be considered as being either discriminatory or unreasonable from any facts disclosed from a study of that rate alone, but each rate must be considered in connection with its relation to every other rate and its effect upon the schedule as a whole.

The Wisconsin Telephone Company operates in practically all parts of the State of Wisconsin. Its property includes 80 exchanges, and approximately 40,000 miles of toll wire. For convenience in operating, and for statistical and comparatvie purposes, certain sub-divisions are made of the several kinds of property used in the plant, and to meet the requirements of the public utility law a report of the operations at each exchange and of the toll property as well as of the utility as a whole, is made to the Railroad Commission as of June 30 each year, but the investment in the property and its operation throughout the state are always considered as a whole.

Milwaukee, being the largest city in the state, is necessarily operated in a class by itself. There are a number of cities in the state which naturally group themselves into the next class and take one schedule. About the same number of places arrange themselves into a third group, all of which have approximately one schedule. The next group is considerably larger in number, and the schedule applicable to this group is somewhat lower. Still another group is made up of the smaller points, where the service is largely rural and where the lowest rates apply. There has been no effort toward grouping by population, but these various cities and towns naturally group themselves for telephone purposes. While the rates at a number of exchanges are about the same, the investment in the plant and the cost of furnishing the service necessarily differ according to the local conditions at each exchange, such as the area naturally embraced within the exchange limits, the character and difficulties of construction, etc.

A telephone system is never finished, is never constant for any length of time as to investment per station, number of stations, number of patrons in any class of service, or average gross revenue per station. A telephone company, being a public utility, is required to serve the public with reasonable promptness in any territory where it holds itself out as doing business. It is obvious that a company cannot wait until it receives orders for service before it will install the main portions of its plant, for to do so would at times require an applicant for service to wait for months before he could be supplied, which would be unreasonable. Therefore, to enable a company to fill orders for service with a fair degree of promptness, its engineers make the best study possible of a given territory and install such a surplus of facilities as may be deemed advisable from the results of their study.

The surplus facilities installed will bring the average investment per station in service to a high figure at first, but as time passes, and additional stations are installed, the average investment will decrease. Likewise, in the early years of a plant, the high investment will keep the net earnings at a low point, possibly so low that no profit is earned, but from year to year, as the extra facilities are put into service through the additions of subscribers, the net profits increase, and by the time the next period for general expansion is reached, the profits should be quite large, and taking the average results of the years from one period of expansion to another, the earnings should be satisfactory on the investment in that locality, although the rate of return may not be the same for any two years of the period. Of course it would be impracticable to shift rates upward and downward so as to keep the revenue year by year in harmony with expenses, therefore, we must deal with the average results from one extension period to another.

The shifting in classes of service through subscribers changing from one class to another, and moving to new locations before the expiration of the primary contracts for service at the original locations, is the bane of the telephone business, particularly in a large exchange. If an exchange could be held constant as of a given date, it would be very much easier to ascertain the cost of the various factors used in producing service, but with the changes occurring as mentioned, and which shift the units of revenue and expense from day to day, it is impracticable to know and keep track of the definite revenue and expense of the several classes of service and rates which it is necessary to offer in order to secure a proper development in a given territory.

A telephone company which undertakes to supply service over a territory must live up to its duty to the public, and provide facilities wherever it can reasonably be expected to do so at such rates as will enable a substantial portion of the inhabitants to use the service. This means that it will be necessary to extend facilities to communities thinly populated, and which will not be profitable, at least for a considerable time, but it is desirable that the people living in these communities may be able to have service at rates which they can afford to pay, and that the telephone users in the more populous sections may be able to reach these remote points. Therefore, the company must develop the lean districts along with the fat, relying upon the average results from the whole territory being profitable, much as the railroads operate branch lines at a small profit or even at a loss in order to get the traffic they produce, and which is profitable to the main lines. A large per cent of the telegraph stations of the whole country do not originate enough business to pay the expenses of maintaining these stations, yet no one would advocate closing the unprofitable small telegraph office and thus deprive the people in that community from sending or receiving telegrams; furthermore, these points are needed as feeders and distributing stations for the cities and large towns where the bulk of the telegraph business originates. This same lean and fat condition applies to railroad stations, postoffices and other lines of business, and the same reasons that make it desirable for these to be operated or maintained for the benefit of the whole public apply with greater force to telephone service, which is much more interdependent than any of the other kinds of public service mentioned. If each part of a telephone system were required to earn its relative portion of the revenue from the time it is first operated, extensions of exchange lines into rural districts would practically be prohibitive. The building of toll lines into new and sparsely settled communities and exchanges in small towns could not be built, or if built, the rates, to be immediately profitable, would be so high that the service would be prohibitive for general use.

The Wisconsin Railroad Commission, in considering the Antigo water case, touched upon this feature of a public utility as follows:

A mere physical plant, no matter how perfect or how well it is adapted to the purpose for which it is intended, amounts to but little unless it has or can obtain a paying business. Without business it is a dead mass instead of a living concern earning profits. To have profits it must have business or customers who avail themselves of the services it renders at rates that yield an adequate income.

But new plants are seldom paying at the start. Several years are usually required before they obtain a sufficient amount of business or earnings to cover operating expenses, including depreciation and a reasonable rate of interest upon the investment.

A telephone property naturally lends itself to operation as a unit, whether the area be small or whether made up of a number of exchanges extending over a large territory and connected by a toll or long distance system. Each of these coordinate parts has certain peculiarities incident to location, size, character of construction, population, etc. These parts may be operated individually as to service, collections and other details which are naturally local, but they are necessarily operated collectively as to total costs, appropriations for extensions, improvements, financing, administration, etc. Some of the revenue of a telephone company is from toll lines connecting separated communities; some comes from rural or farmer line service, and some from exchange service in cities and towns. While the rates may be approximately the same in different exchanges of different population, different number of subscribers, and the cost of furnishing the service may be variable at these several exchanges, these differences in costs and rates must in no case amount to charging an unreasonable or unjust rate for the service rendered. It is, therefore, of prime importance, not merely that rates shall not be unreasonably and unjustly discriminatory as between the several communities or classes of communities, but that recognizing, within reason, differences of conditions, the rates in any local community, classified according to conditions, shall be so adjusted as to give a substantial local development or reasonable expectation of development to the property and service there localized. In all cases the company must make an earnest effort to so adjust its charges that considering the service rendered, each community will contribute its fair proportion of the revenue and expenses of maintaining the property and running the business.

The New York State Public Service Commission for the Second District, which has supervision of the telephone business for the whole state, some months ago investigated the rates charged for service between the Borough of Manhattan and the other boroughs in the city. The president of the company, in giving testimony in this case said:

I want to really emphasize and bring out one point here, that over this vast area so widely varying in its character in different locations we have tried to apply the rate that suited that locality to bring about the greatest development there, and then have tied them together with toll lines, attempting to equitably distribute the whole burden of telephone service in this city among various classes of users, with the idea always that we must do everything we could to develop those outlying smaller sections. * * *

There are a great many factors, one of which is the cost of the service in that locality, but it is not controlling; one of which is the value of the service to the user in that locality, but it is not controlling. And I do not know that I could lay down any empirical rule, but simply say we use our business imagination, or use our business sense. We use all the common sense that we have in trying to make the rate fit the needs of the various communities without serving one class at the entire expense of another class just as far as we can, being governed always in the rate scheme as a whole by the net return or the average return that it yields upon the property devoted to public use. * * *

It is impossible to say exactly what any branch of the business earns in and of itself. It is impossible for us, for example, to segregate the cost of conducting traffic across the East River between Brooklyn and Manhattan with exactness because the same telephones, the same cables, the same conduits, the same buildings, the same switchboards, the same operators handle the different classes of traffic. It is impossible to segregate them with exactness, and when we attempt to segregate them we have to make assumptions according to our best judgment and get the results as best we can. I say this because it is impossible to say with exactness just what we earn in New York City and just what we earn in Manhattan as related to the investment in Manhattan.

In summing up its conclusions in this case, the commission said:

There is a demand for toll service in the City of New York which is not satisfied because the cost now exceeds the value. In other words, there is a large demand for service for which the consumer can afford to pay five cents, but for which he can not afford to pay ten cents.

It is the duty of the respondent to meet this unsatisfied demand for telephone service, if the same can be done with due regard to financial results. The respondent has recognized this principle, according to its evidence, continually in the City of New York and has thereby developed a business of enormous proportions, as well as enormous profit. It is gratifying to know that this principle of duty is identical with the principles of good business policy.

We have accordingly, in the determination of this case, had in mind the total investment of the respondent, its investment in the City of New York; the general cost of operation; the necessity of making reservation out of income for surplus and contingencies; and the returns actually received by respondent from its operations in the City of New York, in part as well as from its operations as a whole.

Mr. Henry C. Adams, in charge of statistics and accounts for the Interstate Commerce Commission, in discussing cost accounting in a paper published in the *American Economic Association Quarterly*, April, 1910, said:

I do not believe that the principles which underlie cost accounting are pertinent for the solution of the problem of reasonable rates, nor do I have much confidence in the judgment of experts, whether they be experts in the employ of the carriers or of commissions, who claim that they can compute the amount of net revenue contributed by a particular rate. This paper assumes that it lies beyond the ability of statistics and accounts to measure the specific cost of a specific service under specific conditions. * * * That the cost of doing a business is an essential element in arriving at a proper price for the service rendered is universally conceded; but there are two ways in which the rule of cost may be applied. It may be urged, as already indicated, that specific cost should be measured against specific service; or it may be urged, as seems to many preferable, that total cost should be measured against collective service.

This principle of considering a telephone property as a whole is not confined to the United States, but the Board of Commissioners of Public Utilities of New Brunswick in July, 1911, investigated the rates charged in the city of St. John. The following is taken from the decision of the commissioners in that case:

It has been repeatedly and very forcibly argued that we should in effect separate the St. John exchange from the rest of the province and reduce St. John rentals, on the ground that the St. John exchange has a large surplus after paying all expenses of operation, properly chargeable thereto. * * *

We do not think that it is possible to separate the St. John exchange from the rest of the province. The whole territory is operated as one system, and St. John is so related to all the other exchanges and they to it, that we do not believe it is practicable to establish a dividing line between interests which are so closely united, even if that were a proper thing to do, looking at the matter from all points of view. The board is of the opinion that the system of the

New Brunswick Telephone Company must be considered as a whole for the purpose of ascertaining whether any reduction shall be made in the rates, tolls and charges made by it for service rendered. * * *

The whole system is so interwoven together and the several parts so correlated that divisions or distinctions of interest or advantage of plant values of revenues and expenses can only be approximations. It is true that the St. John exchange earns a relatively larger income per telephone than any other exchange in the province. This is naturally what one would expect, St. John being the largest commercial center, but it is also true that the service in St. John is more expensive than in smaller cities or towns or in the country. * * * The only question is, whether the St. John subscribers are paying an unduly large proportion. * * *

Taking into consideration the situation in St. John and in all the other parts of the province, the rates in force in St. John and in the other cities and towns, and having the evidence before us that rates are graded by other companies which serve similar territories in about the same manner and proportion that they are graded with, we are not prepared to say that the rates in St. John are unreasonable or unjust.

In the very early period of the telephone exchange, the same price was charged for both business and residence service, but comparatively few residence subscribers were secured, and it soon became apparent that in order to obtain residence subscribers there should be a differential between business and residence rates in favor of the residence. The plan was also developed of putting several subscribers on one wire or line, which provided a means of making a lower rate than for a special line. In this way telephone service came to be supplied in almost all exchanges at flat annual rates for unlimited service, but no one then realized that the amount of use of the telephone would have any material bearing on the cost of doing business.

As a general proposition, there is in all lines of business some relation between the cost of production and the selling price. We find the grocer sells such staples as flour and sugar at a very small profit, and possibly at times at some loss, but on fancy articles, bottled and canned goods, his profits are larger, and on his whole business he expects to get such an average profit as will yield a fair return upon the capital invested in the enterprise. The manufacturer of shoes does not charge a different price for each size manufactured, but several sizes are grouped together at an average price for the sizes so grouped. The merchant tailor makes no reduction in the price of a suit of clothes made for the small man, but charges his customers, large and small, the same price for the same kind of a suit, and in so doing deals with the average of all of his customers. Iron ore, coal and fluxing material shipped to a blast furnace take about the lowest rate charged by a railroad for moving freight. Pig iron, produced by the blast furnace, shipped to a rolling mill, takes a higher rate. Sheet metal produced from the pig iron, when shipped to the sheet metal worker, takes a much higher rate, and the product turned out by the sheet metal concern takes a still higher rate, thus making four different rates charged for practically the same material when shipped in different form, yet each rate may be a proper and satisfactory charge for the service rendered. There is, of course, much less profit to the railroad from handling the raw material going to the furnace than there is in moving the pig iron from the furnace to the rolling mill, but if the railroad were to charge the same rate per ton, or car, for the raw material and the finished product, there would be no raw material moved, because the rate would be prohibitory, and without the raw material there could be no finished product, hence the adoption by railroads of the method of charging for moving freight, what the service is fairly worth to the shipper and relying upon the average of all rates to yield a profitable return.

This principle of an average return extends to all lines of merchandising and manufacturing, and in no line of business is it possible to always obtain a horizontal rate of return based on the cost of production, or the cost of service rendered. Neither does it follow that under this method any one will pay a price entirely out of proportion to the cost of production or to the value of the product furnished.

Telephone plant and facilities must be provided for the maximum load throughout the twenty-four hours every day in the year, although used to the maximum only a few hours of the twenty-four. The relative cost of furnishing service at night is greater than during the day, because with a comparatively small load at night, relatively more operators are needed than during the day. The cost of rent, light and heat also is as great at night with a small load as during the day when the load is heavy. A subscriber who does not usually call at night may suddenly shift his business and make considerable use of night service. This is particularly noticeable before and during the holiday season, when manufacturing concerns, jobbers and others, who ordinarily are not open at night, suddenly begin using the service up to 9 or 10 p. m. The telephone company has no advance notice of this shifting of hours and additional traffic by subscribers, but it must constantly be ready to carry the increased load. All of these factors tend to vary the cost of supplying the service and to make the finding of the definite cost very difficult.

If a subscriber always used the same length of line, the same portion of apparatus at the central office and at the same hour day after day, it would simplify rate making, but with every subscriber calling for every class of service at varying periods, using lines of varying lengths, varying lengths of conversations and varying portions of central office apparatus, the costs become so involved that attempts at actual figures lead to apportionments and approximations which are but little better than estimates.

The call is sometimes spoken of as the unit of telephone service, but on a close analysis this is scarcely warranted, in the sense that the kilowatt and cubic foot are units of measure of electric current and gas. It is true that all service is obtained through the call, but there are different kinds and grades of calls, each of a different value to the person making the call. The chatter of two school girls over the telephone would be considered of little value or consequence, when compared with the call of an anxious mother for the family physician in the case of a serious accident to her child. There also is a substantial difference in the value to the subscriber of a call inviting a friend to lunch, and a call for the fire department when his house is in flames. The call in an exchange of small area, where subscribers are near each other, is of less value than it is in an exchange of large area with subscribers widely separated.

It is generally agreed among telephone men and students who have investigated telephone rates, that in exchanges having a large population the service should be paid for on a basis of use, generally termed

a measured or call basis, except possibly some kinds of residence service where the traffic is naturally limited, which may be on a flat rate basis. It is also generally conceded that in such exchanges the lowest rate per call for the minimum amount of service should be five cents. Some companies undertake to supply a minimum amount of service by means of a coin collecting device on a party line, under a guarantee from the subscriber to use at least one outgoing call per day at five cents per call, or an average of $1.50 per month. This also includes the subscriber's incoming calls, and in very many instances these minimum guarantee stations are installed for the purpose of getting incoming calls under arrangements made with subscribers having unlimited service to call them. This increases the traffic load on these minimum rate lines, and really makes the incoming call a factor in furnishing this minimum rate service. No method, however, has as yet been found for measuring telephone service by the incoming call, all efforts towards measurements having so far been by the outgoing call, although the outgoing use of a telephone may be no real measure of the value of the service to a subscriber whose incoming use is large and whose outgoing use is small.

All telephone managers and all regulating bodies agree that there must be a differential rate between business and residence service. This difference, however, is usually out of all proportion to the difference in the cost of furnishing the service. It is also generally agreed that there must be more than one class of business and residence service, so the customer may be given some choice as to class and rate, as the new subscriber does not usually begin at the top rate, because he ordinarily does not require much service as a beginner. After a time, when he finds he can profitably make a greater use of the service, he progresses to a higher class and rate, and may ultimately become a top-rate user.

The following general principles of charging for telephone service seem to be inherent in the telephone business, and to have been arrived at by practically all who have had anything to do with making a telephone rate schedule:

1. There must always be a differential rate favorable to residences, which must be made up by a relatively higher charge on business service.
2. To secure a reasonable development, there must be a reasonably wide range in rates, including a low rate for small users, that may produce little or no profit.
3. The rates in a large exchange must be higher than in a small one, the investment ratio and cost of doing business being greater in the larger place.
4. The rates charged for each class of service under varying conditions must be just and reasonable, but it is impracticable to base such charge wholly on the cost of furnishing each class of service.
5. The complete results of the operations of a telephone property are ascertained only through considering the average of all rates and the property as a whole.

The quality of service is of greater importance to the telephone subscriber than the question of rates. There is no kind of service furnished by a public utility in which the shortcomings affect the customer so quickly and so vitally as with the telephone. Poor telephone service is worthless at any price, and is promptly and properly condemned by everyone. The public wants good telephone service and does not want rates scaled down to a mere living basis, that will not admit of improvements being added as fast as developed, so as to keep the grade of service at a high standard. Telephone men receive a hundred complaints of service against one complaint of rates, and my experience has brought me to the conclusion that if we furnish the public with satisfactory service, there will be no trouble in getting satisfactory rates. Intelligent selfishness if nothing else should, therefore, encourage us to furnish good service at all times.

Considering the telephone rate problem broadly, it is not essential that the definite cost of every particular class of service be ascertained prior to making a rate schedule that will be satisfactory to subscribers, and at the same time be fair and equitable as a whole. Even should these costs be ascertained with a fair degree of accuracy, the attendant expense of finding them would be greater than could ordinarily be justified, and when found the figures would not show enough difference in the cost of furnishing different classes of facilities to warrant the difference in rates that must exist to secure a proper development. Therefore, in view of all the elements that must be considered in supplying the public with telephone service, there is ample justification in rate making for considering the value of the service to the user, as well as the cost of providing the service.

South Bend Made Telephone Center

South Bend became the long distance distributing point for 300,000 independent telephones in Indiana, Michigan and Ohio, and was placed in connection with 500,000 additional telephones in Illinois, Missouri and Wisconsin, when the new long distance line from South Bend to Chicago was opened March 5.

The event occurred at 3:30 o'clock with brief ceremonies. The first communication over the new line was between Mayor Charles L. Goetz, of South Bend, and Mayor Carter H. Harrison, of Chicago. The city officials exchanged brief greetings, then Mayor Harrison was connected with Mayor John A. Herzog, of Mishawaka, and they talked. The system at once went into actual use.

The new connections are made possible by the construction of two new copper circuits by the Postal Telegraph Company. The South Bend Home Telephone Company has leased the wires, which enter that city via Laporte and Westville. The line, which is 114 miles long, has been in construction for four months. In addition to becoming the distributing point for the independent telephones in Indiana, Michigan and Ohio South Bend is assured direct connection with all automatic telephones in Chicago.

The remainder of the 500,000 telephones on the western end of the circuit are in Illinois, Wisconsin and eastern Missouri, the field of the Inter-State Telephone Company. Independent telephones in St. Louis, Mo., are included in the new territory.

Concrete Poles in New Zealand

Reinforced concrete telegraph poles are being used by the Postal Telegraph Department of New Zealand on the line between Auckland and Hamilton. Over 1,200 of the poles have been set up. They measure 26 feet high and taper from 6 by 8 inches at the base to 6 by 6 inches at the top. The poles are claimed to be only slightly heavier than the wooden poles they have replaced.

Digest of Foreign Telephone Literature

Translated for Our Readers

EXPERIMENTS WITH A HIGH TENSION MICROPHONE—EGNER-HOLMSTROM.

WHEN Waldemar Poulsen in 1906 brought out his wireless system using undamped or slightly damped waves of high frequency, he was able to demonstrate the feasibility of wireless telephony from a practical standpoint. There was great need, however, for a long distance microphone, which could resist high tension currents, and vary the oscillation of the waves so as to harmonize with the vibrations of the sound waves used in speaking.

Several years later, after long experiments, Egner and Holmstrom succeded in solving the problem and producing a microphone which was useful not only for wireless telephony but also for ordinary long distance telephone service. Before going into the construction of the microphones proper, it will be necessary to treat the theoretical points considered in the designing of the transmitters.

The first new departure from usual standards lay in the plan to surround the microphone contacts with some gas other than air, partly to cool the contacts, and partly to protect them from oxidation. An added reason was the possibility of obtaining better microphonic effect through a possible advantageous iron formation at the contact surfaces. The tests made with various gases or liquids, showed that certain gases, especially pure hydrogen, gave the best results. It was found out at the same time that other factors were of equal importance, and it was necessary to find out the nature of these influences.

The apparatus consisted of a strong hard rubber plate set upon movable feet and a channel which contained mercury. At the center of the plate was an arrangement for the reception of a carbon grain element. A strong iron pole fitting into the channels and resting on set screws fitted into the rubber plate was to carry the diaphragm. The vibrating upper electrode was attached to this diaphragm. The set screws could be used to vary the relative position between the upper electrode and carbon grain cell, consequently the pressure between the contact surfaces. The instrument had also intake and outflow pipes for the gas and cooling water, latter for cooling the diaphraghm. This diaphragm was made of thin aluminum and tightened by means of tension springs.

The great voltage with which the experiments were made, necessitated the use of a large carbon element with large surface, and as a result the amount of heat per unit area produced by the current was not as great as might have been the case with a smaller carbon element. One drawback lay, however, in the fact that the pressure on the contact surface was not the same at every point of the vibrating electrode. The result was that even a slight variation of pressure between various points resulted in a decreased efficiency of the microphone.

Several additional elements must be considered. It was not advisable to place the electrode directly against the diaphragm or even to use the latter itself as an electrode. Tests showed that the heat produced by the current in the carbon cell brought about property changes within the diaphragm, whereby the vibrations of the diaphragm and the pressure regulated by the set screws were changed. It was therefore necessary to increase the distance between the diaphragm electrode and the diaphragm. At the same time the danger lay near that the electrode would vibrate with greater frequency, since the pressure difference in the contact surface acted as a sort of lever in its effect upon the diaphragm.

The final results showed that the best method to obtain a diaphragm with the oscillation loop in the center, was to stretch the diaphragm like a drum head. For this reason it was necessary to use a soft and light metal like aluminum, tightening the aluminum diaphragm gradually, with long rests between increasing tension.

After obtaining good results in this relation, further investigations were made in the field of pressure between contact surfaces. A change in the position of the upper electrode of even .001 inch produced great changes in the microphone resistance. If the pressure against the carbon grains was too small, speaking was accompanied by a more or less loud roaring noise, an indication of the production of small electric arcs between the contacts. If the pressure was gradually increased, a point was reached at which this roaring grew weaker and weaker and finally disappeared, and the microphone produced strong sound waves. A further increase of the pressure, decreasing the strength of these waves improved articulation, however.

The width of the microphone cell, *i. e.* the size of the contact surfaces between electrode and the carbon grains, has little or no influence upon the microphone resistance. At a certain current strength, the microphone voltage and the microphone effect remains the same, independent of the size of the electrode, provided the other relations are constant.

The current strength, however, influences the microphone resistance enormously. The resistance decreases considerably as the current strength increases, so that the microphone voltage seems to retain a constant value. This is evident when we consider that the microphone voltage tends to remain independent of the current density in the microphone cell.

The tests likewise proved that carbon surfaces for the electrodes, and carbon grains, *i. e.*, carbon as material for the microphone contacts, is better than metal surfaces. The nature of the carbon grains is of great importance, different carbon grains giving varying results. The nature of the carbon electrode surface, whether polished or rough, seems to have no influence, provided a high tension current is used.

The tests with different gases were made by having the gas to be tested flow through the microphone. Only hydrogen and illuminating gas (coal gas) showed a good influence upon the microphone. With the hydrogen, the microphone was able to work with a higher tension than usual, and the microphone resistance was greater. The transmission of sound was clear and without overtones when hydrogen was used. The use of hydrogen makes the use of the microphone

rather complicated, however, and cannot be used very well for ordinary telephone service, though it will do admirably for wireless telephone stations.

Another factor of great influence was the temperature of the carbon cell. The increase of temperature caused by the current has several bad influences. It results in the extension of the cell parts and destroys the proper pressure balance. Again it destroys the cell insulation, if this is made of felt or similar material, and disturbs the oscillating properties of the diaphragm. To keep the temperature within reasonable bounds was, therefore, of great importance, and this was done by cooling the carbon cell by means of running water or some other liquid and protecting the diaphragm by means of a cooling coil placed between the carbon cell and the diaphragm. This necessitates a rather complicated system of pipes, etc. A horizontal diaphragm below the carbon electrode receives better protection against the heat produced in the cell, the heat rising upward and moves away from the diaphragm. Heat transmission between carbon cell and diaphragm was also made more difficult by an insulating layer of mica or similar material. The upper stationary electrode was mounted upon a copper plate. This plate formed the bottom for a cooling liquid tank, which was filled with water or some other liquid. The heat produced in the carbon cell passed through the electrode to the copper bottom and then on to the lower portion of the cooling liquid, when this rose and was replaced by the colder liquid. In this way an automatic circulation distributed the heat produced over the entire area of the liquid tank, and was dissipated by the latter through the action of heat radiation and constant flow. Finally a state of equilibrium was reached in which as much heat was radiated as was produced in the carbon cell. The construction of the carbon cell itself was diffiicult, on account of the comparatively high carbon cell temperature which could not be avoided in spite of the excellent cooling effect. At first an open cell was used. This was found to be impracticable and a closed cell was substituted. Felt was found to be the best material to enclose the cell on all sides. Since felt will burn, however, when a high voltage current is used, a thin sheet of mica was used as insulation and this was placed on the outer edge of the carbon cell. In this way very little current passed through the carbon grains nearest to the felt insulation and no heat was produced in this neighborhood.

The upper electrode was divided into two parts, namely an inner part, connected directly with the copper bottom of the liquid tank, and an external circular part, insulated towards the tank by a thin layer of mica. The current was conducted from the one section of the upper electrode to the vibrating electrode, and from there back to the other section of the other electrode. The current passed twice through this cell, making the transmitter act like two series connected microphones. The result is that the microphone acts with greater voltage, so that the same returns can be obtained with low current strength as with higher current strength and lower voltage when using a simple microphone. At the upper end of this microphone a set screw was attached, by means of which the liquid tank and the attached electrode could be raised or lowered, regulating the pressure at the same time. In this instrument electric light current was used to feed the microphone.

If this microphone works on a feed current of 220 volts and is properly set, it uses one ampere and has a microphone voltage of about eight volts. If words are spoken into the microphone (for example the letter *a*) the voltage rises to 12 to 16 volts. A condenser of 30 to 40 microfarads forms a shunt for the currents produced by the microphone when in use. A choke coil and the condenser prevent fluctuations in the feed current from reaching the microphone current circuit and disturbing the action. This microphone was tested for Berlin to Stockholm and Paris to Stockholm, a distance of 2850 km. (1767 miles) and gave excellent results.

As was said before the above instrument works like two series connected microphones, and it was now tried to find a system for use in a larger number of cells. There is a need for this, since the microphone resistance is decreased when the current strength is increased, and because it is desirable to vary the microphone resistance so as to be in harmony with the current circuit in which it is to work. Earlier attempts had been made to achieve this end, with negative results, as the cells could not be made to work in the same phase, and with the same amplitude.

The new arrangement using a tightly stretched diaphragm, being in constant connection with vibrating electrodes, seemed especially fitted for the construction of multi-cell microphones. A six cell microphone was next constructed, by dividing the diaphragm electrode into six separate parts, which were insulated from each other, but still connected with each other and with the diaphragm. A carbon cell was allowed for each of these sections. Each cell had an adjustment of its own, provided with a cooling system. This microphone was successfully used for telephoning a distance of 280 km (173.60 miles.)

A great disadvantage of all these instruments lay in the necessity of accurate adjustment of the pressure between contacts. This was especially true with the multi-cell microphones, where the adjustment took much valuable time. For practical use these drawbacks had to be eliminated. To this end the instruments were designed in such a way that the diaphragm was in a vertical position. This made the pressure in the cells depend only upon the size of the cells and the number of carbon grains. The pressure of the carbon grains upon the electrodes is then equivalent to a hydrostatic pressure. The cells were made of small size, using several of them with a common diaphragm, allowing them to be connected either in parallel or in series. A change of volume in these cells due to changes in temperature is of no great influence upon the carbon grain pressure, provided the change is not too great.

Experience has proved that the distance covered by the ordinary telephone service is proportional to the relation between the outgoing and incoming current strengths. Good communication is possible only if the strength of the incoming current is equal to about 130 of the outgoing current. This is equivalent to about 2000 km (1240 miles.) To speak twice that distance it would be necessary to have a microphone which produces current 30 times the strength of the ordinary microphones. The microphones described above achieve this result. But this is hardly required under present conditions, and all we need is an increase in distance equal to about 70 per cent of present

practice, for which microphones of only 10 to 12 times the ordinary microphones are needed.—*Elektrotechnische Zeitschrift.*

Spain's Telephones

Consul General Henry H. Morgan, Barcelona, says the telephone service in Barcelona is operated by the Sociedad General de Teléfonos (General Telephone Company), which is under the management of the Compañía Peninsular de Teléfonos, the most powerful company operating in Spain. There were 3,900 subscribers on December 31, 1910.

The right of operation has been obtained by concession from the government for a certain time, the service becoming state property after the expiration of this term. During the period covered by the contract the treasury department receives a certain percentage of the gross receipts of the company. The tariffs in force are all approved by the director general of telegraphy in Madrid.

Subscribers may communicate at any hour during the day and night, no additional tax being charged for night service. Through a special arrangement it is possible for the subscribers to receive or send interior and international telegraphic messages by telephone, the tax being 2 cents for each message received or sent, not containing over 20 words, and 1 cent for every additional 10 words or fraction thereof.

The telephone rates now in force in Barcelona are as follows:

General annual rate for subscribers, whether the telephone station is for private use or for use in casinos, societies, bourses, hotels, saloons, and other public establishments, $54. This rate is reduced by 40 per cent for official stations, and stations in charitable institutions and newspaper offices.

An annual rate of $39.60 is charged for stations in private residences of presidents and secretaries of official corporations, directors of cemeteries, judges and their secretaries, chiefs of the fire brigade and police, and directors or chiefs of daily newspapers.

Stations which are established over 3 kilometers (1.86 miles) from the central office pay an additional rate of 4 pesetas ($0.72) for every 100 meters (109 yards) of line or fraction thereof, up to 10 kilometers distance (6.21 miles) from the central office, which is the legal exploitation zone of the company.

Extension stations upon the same circuit and in the same building in which the main station is established cost $7.20. The same upon separate premises cost from $18 for distances of 200 meters (219 yards) to $36 for over 500 meters (547 yards). Lines going outside of the 3-kilometer zone pay in addition the extra tariff mentioned above.

By special authority from the director general of telegraphy a long-distance telephone service has been established between Barcelona and the following cities: Bilbao, Ciudad-Real, Gerona, Madrid, Palamos, Reus, San Sebastian, Tarragona, Terrasa, Saragossa, Alicante, Cartagena, Castellon, Cordova, Guadalajara, Huesca, Lerida, Logrono, Seville, Tortosa, Valencia, and a small number of other places of less importance. In addition there is a communication between Barcelona and the telephone company of the Province of Guipuzcoa, comprising 59 of the most important towns in that Province.

The charge for long-distance communications for every three minutes is as follows: Up to 50 kilometers (31.07 miles), $0.09; 51 to 100 kilometers (31.68 to 62.14 miles), $0.135; 101 kilometers upward, $0.09 for every additional 100 kilometers (62.14 miles) or fraction thereof. In order to make use of this service it is necessary for the subscriber to deposit a certain sum of money in advance at the central office in payment of the expenses.

A list of towns in the northern part of Spain, where the telephone service is operated by the Compañía Peninsular de Teléfonos, together with the number of subscribers on December 31, 1910, and the subscription rate now in force in each of the cities follows:

Cities—	Subscribers	Rate
Bilbao	1,300	$32.40 to $54.00
Reus	189	32.40
Tarragona	189	32.40
Mataro	210	21.60
Palamos	190	28.80 to 72.00
Manuresa	283	17.28 to 32.40
Sabadell-Tarrasa	800	17.28 to 32.40
Martorell	52	32.40

The varying rates in some towns are due to the fact that individuals pay a smaller rate than clubs, societies, saloons, and other public institutions, where the use of the telephone is naturally greater.

In Madrid the telephone service is operated by the Compañía Madrileña de Teléfonos. The number of subscribers at present is 3,600, and the annual subscription rate 300 pesetas ($54).

Long-distance rates are as follows for communications of three minutes' duration: From Madrid to Barcelona, Manresa, Mataro, Tarrasa, and Valencia, $0.765; Madrid to Bilbao, Castellon, San Sebastian, Tarragona, and Vitora, $0.675; Madrid to Pamplona, $0.585; Madrid to Saragossa, $0.405.

Subscription may be made for daily long-distance communications of three minutes' duration at the following annual subscription rate:

Distance in kilometers—	Distance in miles	Rate
50	31.07	$ 29.70
51 to 100	31.68 to 62.14	43.20
101 to 200	62.76 to 124.27	73.89
201 to 300	124.89 to 186.41	102.60
301 to 400	187.03 to 248.55	135.00
401 to 500	249.17 to 310.08	162.00
501 to 600	311.30 to 372.80	190.80
601 to 700	373.44 to 434.96	211.40
700 to 800	435.58 to 497.09	250.20

A special reduced tariff exists for newspaper offices.

The city of San Sebastian has a municipal telephone service, the number of subscribers on December 31, 1910, being 832. The tariff at present in force is as follows: For each private station, for the exclusive use of the subscriber, his family, and servants, $4.59; stations for business purposes, $5.74; stations for use in societies, clubs, saloons, theaters, railway stations, and other public institutions, $11.47; for the press, $3.06. Stations established over 3 kilometers (1.86 miles) from the central office pay an additional tax of 3 to 2.50 pesetas ($0.54 to $0.63) for every 100 meters (109 yards) of line or fraction, according to the distance of the station from the 3-kilometer limit.

Long-distance communication exists between San Sebastian and 39 different communities, the rate for a conference of three minutes varying from $0.09 to $0.765, according to the distance of the city with which the communication is desired.

Santander also has a municipal telephone service. The number of subscribers on December 31 last amounted to 580. Long-distance communications may be had at the following rate for every three minutes: Fifty kilometers (31.07 miles), $0.09; 51 to 100 kilometers (31.68 to 62.14 miles), $0.135; 101 to 200 kilometers (62.76 to 124.27 miles), $0.225; for 201 kilometers (124.89 miles) and upward, $0.09 is charged for every additional 100 kilometers (62.14 miles) or fraction thereof.

The Telephone Scrap Book

Largest Composite Cable in the World

WHAT is said to be the largest composite telephone and telegraph cable in the world is shown in full size section in the accompanying illustration from the London *Electrician*. It was made for the Western Trunk line of England, and the following are particulars of it:

56 conductors each 100 lb. per mile.
8 conductors each 150 lb. per mile.
22 conductors each 200 lb. per mile. (screened telegraph cores).
44 conductors each 70 lb. per mile. (screened telegraph cores).
7 conductors each 40 lb. per mile. (screened teleg. Worming cores).

Total diameter ..... 3.66 in.
Thickness of lead..... 0.160 in.
Approximate weight per mile..... 630 cwt.

Electrostatic capacity 100 lb. cores 0.06 mfd. per mile, wire to wire.

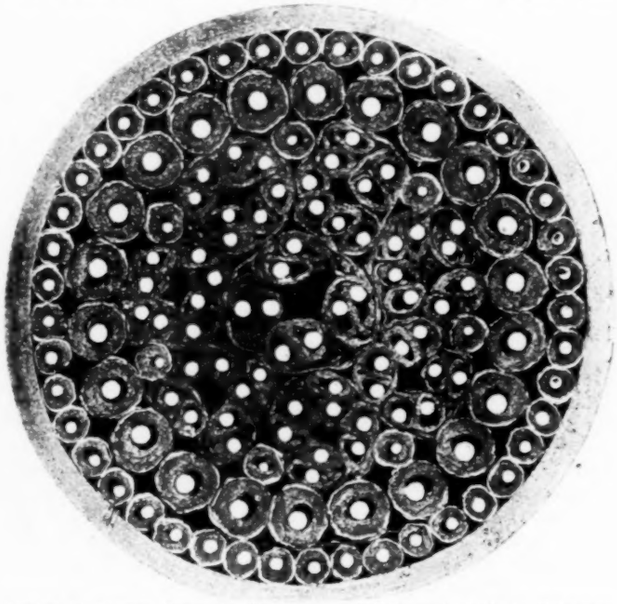
Electrostatic capacity 150 lb. cores 0.056 mfd. per mile, wire to wire.

Electrostatic capacity 200 screened cores 0.125 mfd. per mile, wire to earth.

Electrostatic capacity 70 screened cores 0.120 per mile, wire to earth.

Electrostatic capacity 40 screened cores 0.095 per mile, wire to earth.

In such cables, as the conductors used exclusively for telegraph purposes are not worked on the metallic circuit, they are insulated in a somewhat different manner from the telephone cores and are enclosed in a copper "screening" tape sufficient, in their case, to eliminate inductive interference. These conductors are covered with a longitudinal layer of paper and

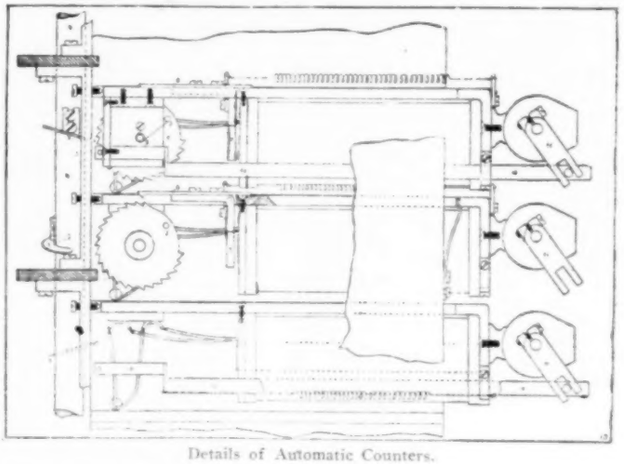


Section of Largest Composite Telephone and Telegraph Cable in Existence (Full Size).

then at least two paper wrappings, which are so arranged as to form helical air-spaces throughout the length of the core. The conductor so insulated is enclosed in a final wrapping of paper forming a closed helix without overlap, and completed by means of a helical winding of copper tape, having an overlap measuring about 30 per cent of its own width. It is the invariable practice to surround the telephone conductors, which have been cabled together in the manner already described, with the screened telegraph cores, so that the latter are in direct contact with the lead sheathing, and therefore grounded.

An Automatic Call Counter

IN Copenhagen it was desired to arrange an automatic connection counter in the common battery and magneto exchanges already working. As a second condition the time "T," in which the answering



Details of Automatic Counters.

plug remains in the answering jack, was taken into consideration.

In the case of affective call counts, "T" is considerably greater than in the cases of ineffective call and false signal counts. The counter is constructed so that it separates the greater values of "T" from the smaller values of "T."

An automatic counter described by P. V. Christensen in the *Post Office Electrical Engineer's Journal* is constructed so that it only registers the calls for which the time is "T" > 30 seconds. The counter is worked by an electric motor, and it must be noted that an alteration of "T," for instance of between 15 and 45 seconds does not require a differently constructed counter, but only an alteration in the transmitting gearing between counter and motor.

The diagram shows the details of construction. *11* is a "Veeder counter," the lever of which is worked by the rod *10*. An electro-magnet *6* carries the armature *7*. The armature is drawn away from the magnet by means of the spring *9*. The armature carries a pawl *8*. When the electro-magnet attracts the armature the pawl *8* engages a ratchet-wheel *1*. This ratchet-wheel is carried by two pivots, and is held at rest by the spring *2*. At the left is seen the rotating shaft *4*, on which is fixed a slanting blade *5* (screw sector) for each counter. The blade *5* engages a ratchet of the wheel *1* and moves it upward during the one-half revolution of the shaft *4*, during the other half revolution of the shaft the ratchet-wheel is disengaged by the blade, and is brought back to its former position by the spring *2*.

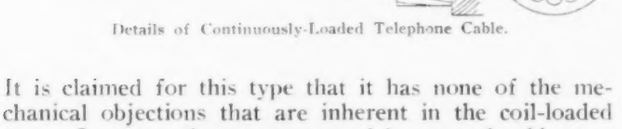
When no current passes through the electro-magnet *6* the ratchet-wheel will permanently have a forward and backward motion with thirty oscillations per minute. The electro-magnet *6* is connected to the subscriber's answering jack in such a way that current continually passes through it when there is a plug in the jack. The moment the answering plug is inserted the electro-magnet will attract its armature, and the pawl *8* will engage the ratchet-wheel. The oscillating motion of the ratchet-wheel will now become a progressive motion, as the backward, but not the forward, motion of the ratchet-wheel is retarded by the pawl. After some time the ratchet-wheel will have turned so far that the tap *3* engages the knee of the rod *10*. During the further motion of the ratchet-wheel the rod *10* will travel in a horizontal direction, and will move the lever *11* of the counter.

When the ratchet-wheel has turned yet more the last ratchet of the wheel will have passed the blade *5*, and the wheel will then remain in this position whilst the lever of the counter will be drawn completely back. When the plug is withdrawn from the jack the electro-magnet *6* is demagnetised, the spring *9* removes the pawl *8* from off the ratchet-wheel and the wheel is turned back by the spring *2*, while another spring (shown only on the lower counter) moves the rod *10* and the counter lever forward again. By this operation the counter shifts a figure. If the plug was withdrawn from the jack at an earlier stage ("T" < 30 seconds the counter lever *11* would not be drawn completely back, and would consequently not move the figures of the counter.

The New French Telephone Cable

THE accompanying drawing shows the details of construction of the new telephone cable recently laid between Abbotscliff and Cape Gris-Nez by the Telegraph Construction and Maintenance Company, Ltd., on behalf of the French Administration of Posts and Telegraphs.

It will be seen from the diagrams that the cable is of continuously loaded type, and it is therefore of special interest, because it enables a direct comparison to be made with the Pupin coil-loaded cable laid between the same points to the order of the British Post Office.



Details of Continuously-Loaded Telephone Cable.

It is claimed for this type that it has none of the mechanical objections that are inherent in the coil-loaded type. In external appearance and in general cable construction it is identical with ordinary submarine cables, and therefore presents no increased difficulty either in laying, picking up, or in repairs.

The copper conductor, which weighs 300 pounds per nautical mile, consists of a central copper wire surrounded by five copper tapes according to the method introduced by Willoughby Smith, and the inductance loading is obtained by surrounding the conductor with a close helically-wound layer of .012-inch steel wire, the whole being covered in the usual way with gutta-percha to a diameter of .412 inches.

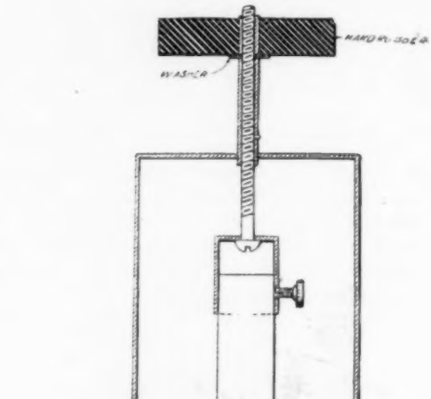
The cable, in all its stages of manufacture, was submitted to rigorous tests by the technical representative of the French administration, and was found to have successfully met all the requirements of the specification. The attenuation constants as measured after submersion and at a frequency of 1,000 alterations per second were found to be .00996 and .00987 per loop kilometre for the two circuits respectively.

A Wireless Telephone Arc

THE construction of a water-cooled arc to use in connection with a wireless telephone transmitting set is described by E. Kurth in *Modern Electrics*.

First obtain a ¾ inch copper tube with a welded bottom, 2 inches long.

Solder a brass disk on the other end the shape

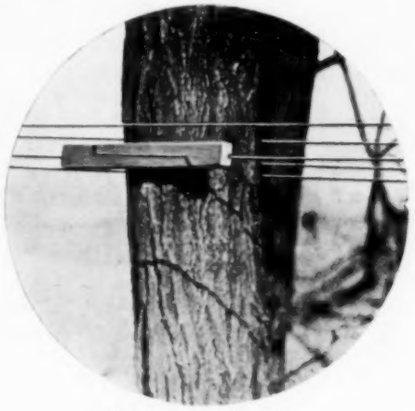


An Experimental Wireless Telephone Arc.

given in drawing. Drill a 3-16 inch hole ½ inch from this end and solder a length of 3-16 inch brass tubing over the hole. On the opposite side, near the top solder a length of ⅛ inch brass tubing as shown in drawing. Then make a bracket of ⅛ inch brass 1 inch wide, 3¼ inches long and 5¾ inches high. Make the upper electrode of carbon and the holder of brass as shown in drawing. Obtain a ¼ inch brass machine bolt 3½ inches long and solder the head of the bolt to the closed end of the carbon holder and pass it through a 1½ inch piece of ¼ inch tube that has a slot running its entire length. Set a small peg in the bolt so it just fits in the slot. Obtain a hard rubber wheel ½ inch thick and 2½ inches in diameter, fitted with a brass bushing tapped to fit the bolt. Place a washer between the bushing and the slotted tube to prevent friction. Mount the whole on a maple base 4½ inches in diameter. This arc must be run on 110-220 volt direct current or alternating current with a rectifier and choke coils if used for a wireless telephone.

A Unique Tree Insulator

INSULATING telephone wires from trees, or avoiding the danger of contact between the wires and the trees, is one of the construction problems that beset the telephone operator. Trimming the trees, with or without permission, has resulted in enough trouble and litigation to make a book, to say nothing of the salt-loaded shotguns and pessimistic bulldogs. But tree



The Morse Tree Insulator.

grounds are common, the leakage losses are serious, and the problem must be met.

The illustration shows a new device designed to overcome the difficulty. As shown, it is extremely simple, and is bound to keep the wire away from the tree. It is being marketed by a concern in Cleveland, Ohio.

Cables Distorted by Frost

THE effects of a severe frost on the ordinary water or gas-pipe are well known, but it is not so generally recognized that electric mains may also be affected in a somewhat similar way, says the London Electrician. This remark is aptly illustrated by what happened to a length of dry core telegraph cable belonging to the Midland Railway and laid near Syston, Leicestershire. Two cables were laid in a 4-inch cast-iron pipe into which water found its way, and the cable was so deformed by the ice forming round it as to become faulty.

It will be noticed that the effect of the ice has not only been to compress but to distort the cable. The amount of compression that took place under these

Section of Cable Before and After Damage.

conditions is shown in the figure, from a section of the original cable.

The cable contains 19 strands each of No. 18 S. W. G. copper wire, weighing 36 pounds per mile. The conductors are formed up in twisted pairs, each pair having a different lay and distinguished by a combination of colored papers. Each conductor is insulated with Manila paper and the whole of them are wrapped with paper tape. The paper is 3 mils in thickness. Care was taken that the lead was perfectly cylindrical, free from pin-holes and other defects. The thickness of the lead was 0.1 in. and the overall diameter 0.73 in.

At first sight it seems rather extraordinary that this breakdown should have occurred at all, the tendency of the ice pressure being naturally to maintain the cable in a circular shape. But in all probability the lead was not quite uniform and, therefore, the flattening shown was due to some slight initial deformation which the ice pressure increased. The cable being air core it was possible to reduce the core to a smaller volume by this flattening process.

A Simple Clip Adjuster

THERE are many forms of adjusters for drop light cords, but the one illustrated here is about as simple as any. It is simply an adaptation of the familiar wooden spring clip-holes being bored in the

Simple Lamp Cord Adjuster.

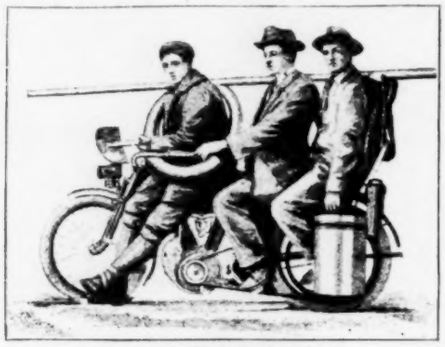
ends to pass the cord through. This device is the subject of a patent application by a Montreal man, S. W. Jennings, and has been approved by the Montreal Board of Underwriters.

Protection of Telephone Lines

IN a recent issue of the *Electrical World*, P. H. Trout, Jr., describes a simple method of telephone line protection which has given good results. He used two 4-candle-power lamps to get rid of the "static" on a telephone line. This line is 1¼ miles long with one telephone at each end, and it is strung about 24 inches below the 2,200-volt single-phase transmission line. Naturally it was quite noisy. At one end he put two 4-candle-power, 110-volt carbon lamps in series between the two telephone wires, and connected the neutral point between the two lamps to the ground. The scheme was very successful. The noise was reduced to a negligible amount, while the telephones operated successfully both on local work and also when they were connected to long-distance trunk lines. The arrangement, of course, affords excellent protection to the telephone operator. The plan is so simple that it seems it would be worth trying ordinary resistances between the telephone wires and the ground before installing complicated devices, even when the power wires are high voltage.

Motorcycle Carries Telephone Corps

IN THE accompanying illustration from *Popular Mechanics* is shown the motorcycle used by the wire chief of a western telephone and telegraph concern, with a load it carried recently, following the com-



Motorcycle With Record Road.

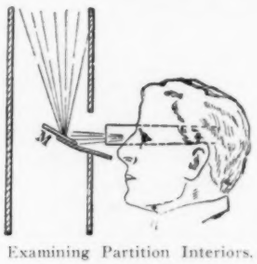
pletion of a stretch of line. It not only carried the three linemen a distance of two or three miles, but also all the tools they had used and the wire and other material left over.

Examination for Superintendent of Construction

THE United States Civil Service Commission will hold on May 29 an examination for the position of superintendent of telephone construction in the Forest Service, Department of Agriculture. The salary is $1,500 per year and the age limit 28 to 45. Applicants should be physically strong and of good health, active and able to stand exposure incident to employment in the national forests. It is desired to secure a man of broad experience, who will be able to study the needs of the telephone service of this district (No. 1) as a whole, and who will be capable of planning for future growth on a broad and permanent basis.

Examining Partition Interiors

A POCKET flashlamp and a little mirror are the only apparatus required to inspect the interior of a wall or partition which would ordinarily be inaccessible, says William Sprout in the *Electrical World*. For fishing wires, retrieving cable and inspecting finished work, this use of the lamp and mirror provides a labor-saving "kink." The mirror has only to be in-



Examining Partition Interiors.

troduced in the outlet hole in the wall, the flashlamp and eye being held behind it as illustrated. The mirror reflects the light of the lamp onto the place to be illuminated, at the same time reflecting the image back to the eye near the lamp. The usefulness of this little device is as great as its simplicity.

Cincinnati Bell Adopts Telautograph

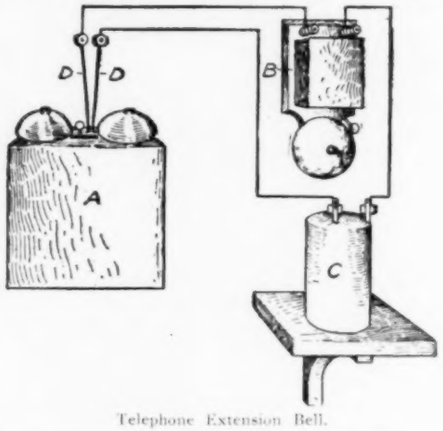
A TELAUTOGRAPH system has been installed between the twelve common battery exchanges and the traffic office of the Cincinnati and Suburban Bell Telephone Company.

This system is comprised of one transmitter, located at the main office, and pilot receivers, located at all the other exchanges, whereby a message written upon the transmitter in the traffic office is instantaneously reproduced in ink upon each of the receivers located at the distant exchanges. The writing is a facsimile of the sender's hand-writing and is easily read. The machines are located upon the record clerk's desks and the system will greatly facilitate the reporting of completed work orders and other business to the various exchanges.

When a new subscriber is installed in one exchange, all other exchanges are advised of the installation instantly, thus enabling the information operators to be right up to the minute with their information.

Hearing the Telephone Bell

THIS is an illustration of an arrangement I devised to call me when the telephone bell rings, says W. D. Young in *Popular Electricity*. My telephone is in the upper hall and frequently I am in the basement and



Telephone Extension Bell.

can not hear it. This device, consisting of two copper strips (*DD*) set in two binding posts works perfectly and does not interfere with the ringing of the telephone bell. The battery (*C*) and bell (*B*) may be located in any convenient place in the house and at any distance from (*A*).

Dallas Talks to New York

TELEPHONE officials successfully conducted long distance conversation between Dallas and New York for the first time March 16. In testing the lines in the past Dallas and New York have talked, but never before with such satisfaction. Climatic conditions were said to be favorable and there was no difficulty whatever in conducting the conversation.

The best service was found in the route via Chicago. This is also the longest, and the distance separating the parties to the conversation being about 2,500 miles. The wires between New York and Dallas, via St. Louis, and via Philadelphia, were also tested. These routes are something like 2,000 miles long, but, while the service was clear, it was believed the longer line by Chicago gave the most satisfactory results.

Telephone Distribution Systems

By H. B. Stabler*

UNDERGROUND WIRES.

SOME of the first attempts to lay underground telephone wires were, as we look back upon them now, quite ludicrous. In Washington one plan that was tried, at heavy expense and with no success, was the placing of bare copper wires in a wood trough in a trench in the street, the wires being held in position and separated from each other by being drawn taut through holes in porcelain plates fixed in the trough; the trough was then poured full of tar, covered with a plank, and the trench filled. Washington's summer climate, however, proved to be a little too much for this system; a gentle slope in the street caused the tar to flow toward the lower end of the conduit, where it leaked out of the containing trough and oozed up between the paving blocks to the street surface. This allowed the wires to cross with each other, making the experiment a failure.

Rubber-insulated cables, similar to successful telegraph cables, were next tried and used to a limited extent for very short distances. As a less costly and more efficient substitute, cotton-insulated wires were formed into a cable, impregnated with paraffin, and covered with a lead sheath; but the same phenomenon that seemed for a while to be an insurmountable obstacle in the way of transatlantic telegraphy made speech difficult through a short length and impossible through a considerable length of one of these cables. The electrostatic capacity of a mile or so of the wire in such a cable, although not noticeable with the comparatively large, slowly interrupted currents used in telegraphy, was absolutely fatal to the transmission of speech, which depends upon the most minute alternating currents, of very high frequency and very complex wave-form. If the little voice-current was not completely absorbed by the capacity of the conductor, it had its wave-form so changed that it could not reproduce intelligible speech at the further end of the line.

The preservation of the wave-form is the important thing. It has been frequently pointed out that with the transmission of power over long-distance by means of alternating currents, the thing sought is to get the largest possible percentage of the developed energy delivered safely at the farther end of the line, while the telephone transmission energy loss is of small importance compared with distortion of the wave-shape. The man who works on the problem of long-distance telephone transmission is probably not at all horrified by the idea of energy losses in the line of ninety-five or ninety-nine per cent, provided he can prevent material change in the shape of the wave.

After the early attempts with rubber-insulated and paraffin-core cotton-insulated telephone cables, the dry-core paper-insulated cable was developed, and there is now more than 7,000,000 miles of wire in use in such cables in the plant of the associated Bell telephone companies.

By means of a wire drawn in while the duct is being laid, or by means of sectional rods pushed through the ducts from one manhole to the next, a hemp or wire rope is drawn through the duct by means of which the cable is in turn dragged into place. In some localities the rat-and-ferret method is or has been in practical use. This consists in sending a rat through the duct, followed by a ferret in harness, who, in his pursuit of his intended prey, draws a light cord through to the next manhole, by means of which a heavier cord or rope, and finally the telephone cable is drawn in.

The splicing of the cable consists essentially in removing the lead sheath from, say, eighteen inches of the ends, boiling the paper-insulated conductors in melted paraffin, so as to prevent both the absorption of moisture by the exposed ends and the passing of moisture back under the lead sheath; the splicing of the bared conductor ends together by means of tightly twisted joints, which are reinsulated by slipping over them tubes or sleeving of paper or cotton; and, after another boiling in paraffin, the inclosing of the entire splice in a lead sleeve which, though much larger than the cable sheath, is thoroughly sealed to it by means of carefully wiped joints. The testing out and splicing of a large cable which divides up into numerous branches, having a total of, say, fifty terminals, and each pair brought out at several different terminals, is quite a complicated job, requiring that many test splices be made.

The necessity for the multiplying or duplicating of the cable pairs in two or more different terminals is readily understood. Suppose a case of a group of twelve city blocks in a good section of the city, a mile distant from the central office, each block containing now a half dozen houses, and fifty per cent of the houses having telephone service. Each block contains fifty building lots, additional houses are under construction, and the prospects are bright that in five or six years these blocks will be built up almost solid with houses of good class, and that seventy-five per cent or more of the buildings will have telephone service.

From the main conduit line in the street a branch conduit carrying a 50-pair cable is run into the interior of each block, and suitable means are provided for carrying wires to each present and prospective house. The twelve 50-pair cables contain an aggregate of 600 pairs of wires, and if these were to be all carried back separately to the central office a mile of 600-pair cable would be required for the purpose, and initially but 36 of the 600 pairs, or six per cent would be in use. If the number of working pairs, by doubling each year, should reach 144 at the end of the second year, this would still be but twenty-four per cent of the total, or, as it is often expressed, the cable would be working at only twenty-four per cent efficiency. During these two years the heavy annual charges would have been carried on a mile of 600-pair cable which had been doing less than the work of a 200-pair cable. This making of a large expenditure for cable plant a long time before it can be made to bring in a return in revenue proportionate to the amount of the investment can be largely obviated by proper multiplying of cable pairs.

For instance, in the case under consideration, it is

*Abstract of a paper read before the Washington and Baltimore Sections of the A. I. E. E., concluded from March.

probable that there already exists at or near the location of the twelve blocks a 600-pair cable of which there are 200 pairs now idle, say pairs 401 to 600. The twelve 50-pair cables are spliced to these 200 pairs of conductors, the cables from blocks Nos. 1, 2 and 3 being each spliced to pairs 401 to 450, the cables from blocks Nos. 4, 5 and 6 to pairs 451 to 500, and so on, each series of 50 pairs in the main cable thus appearing in three of the blocks. This makes it possible to serve 50 subscribers in group "A," consisting of blocks 1, 2 and 3; 50 more in group "B," consisting of blocks 4, 5 and 6, etc., and possesses the great advantage of flexibility; that is, if the telephone growth is erratic, and results in an increase to 40 subscribers in block 1 and only 4 each in blocks 2 and 3, the 48 irregularly distributed subscribers are as well provided for as though there had been an equal distribution of 16 in each of the three blocks. And in like manner ifthe total number of subscribers in blocks 1, 2 and 3 reaches 50, so that all pairs in the main cable from 401 to 450 are in use, while the growth in blocks 4, 5 and 6 has been small, it is very easy to provide for a further growth in the first group of blocks by merely transferring one of the 50-pair cables in the manhole from one series of 50 conductors to another in the main cable, so that, for instance, only blocks 1 and 2 will be served by pairs 401 to 450 and blocks 3, 4, 5 and 6 will be served by pairs 451 to 500. By such re-arrangement of the multiplying, the greatest economy may be secured until such time as each block is fully built up and requires the exclusive use of its 50 pairs all the way back to the central office.

Another reason for multiplying cable pairs is its convenience and economy in furnishing party-line service. This reason was of much more importance several years ago than it is now when nearly everyone prefers his own direct wire to the central office. It is readily seen how, with pairs suitably multiplied, several subscribers in different parts of a block, or in different blocks, may all be connected to the same pair of conductors in the main cable by wiring each to the nearest cable terminal.

In connection with conduit and cable construction the question is sometimes asked why the telephone company cannot connect each building by an underground service, just as in the case of the water, gas and electric light distribution. The principal reasons are very simple. As pointed out above, the several consumers do not each require particular units of these services, but each is tapped on to the large street main which furnishes all customers with varying quantities of exactly the same product. It is unnecessary to make the cross section of the main equal to the aggregate cross section of its services; it will usually be found to be far less in carrying capacity, as it is sufficient that it shall be able to deliver a certain maximum load which is only a small part of the possible load, it being a fact familiar to every one that if all customers should attempt to draw their maximum supply at the same moment, the pressure would drop to but a fraction of its normal value, and no one would receive the electric current, gas or water in sufficient quantities to serve their purposes. But with the telephone, each service, as we noted above, requires its separate pair of conductors all the way back to the central office, and if, after such a service has been established, it is relinquished, the revenue from this individually required plant ceases, while the interest on the investment and other annual charges go on undiminished. When electric light, gas, or water service is relinquished, the only plant which becomes idle is that from the house to the street main, and even this loss is usually "not on the company," if I may so express it, as the investment for such service connections is generally made wholly or principally by the property owner.

With buildings fed by aerial telephone wires from a distributing pole, it is very easy, when house No. 1 gives up its service, to use the cable pair thus released for house No. 2, or No. 20 or No. 40, as the connection may readily be shifted at a cable terminal on a pole or building; but the unavoidable dampness in manholes, and the great number of separate circuits involved, make it essential that all connections in manholes be made in compact, hermetically sealed, lead-armored splices, which cannot be opened for the shifting of connections except at great expense, and then only for a very limited number of times without serious impairment of the cable.

But even this is not all. A water, gas or electric light service once installed is usually suitable for any customer that may occupy the premises. There are exceptions to this, but they are comparatively few. But not so with the telephone service. Last year the occupant of house No. 1, we will say, had party-line service; in the autumn, he moved out and his successor took a direct or individual line, and next year probably another move will be made and the new tenant will contract for a private-branch exchange or increasing of the cable pairs connecting with the central office. By a judicious application of the principle of multiplying, it is found that some of the practical drawbacks to the plan of running telephone wires into houses underground can be considerably mitigated, but, after all, it appears that the demand for underground connections in Washington is really very slight. The company not only entertains requests for it, but in frequent instances, where handsome residences are erected, suggests and recommends it, on the basis of a division of the excess cost of installation between the company and the subscriber; but the subscriber in most cases rejects the proposition, preferring to have an aerial service installed at the sole expense of the company. I suppose, however, that this is but natural, and that if satisfactory gas and water service could be furnished aerially many persons would take such aerial service with free installation in preference to underground at their own expense.

DISTRIBUTION TO LARGE USERS.

The foregoing discussion has dealt with underground service for residences and small buildings where in general but one subscriber occupies the premises. For office buildings, hotels, apartment houses, and all other classes of buildings where either a large number of subscribers are to be found under one roof, or where a single subscriber is such an extensive user of the service as to require a number of cable pairs, underground service is usually warranted and usually installed. In such cases the economical method of distribution is generally the following: A branch of one of the main underground cables—which, from their analogy to electric light and power practice are generally called feeder cables—is run into the basement of the building and suitably terminated, 25, 50, 100 or several hundred pairs being provided according to the requirements of the case. A subsidiary cable, called

the house cable, is run from the point where the feeder cable terminates and distributed throughout the building, with terminals at the various locations from which the service wires can be most readily carried to the several rooms or apartments. These house cable terminals are usually multiplied, so that if the telephone growth is irregular, and excessive in certain parts of the building, the number of pairs provided will still be adequate. At the point where the feeder cable and house cable are terminated side by side, jumper wires are run from any pair in one to any pair in the other, so that any room or suite may be furnished with any class or quantity of service desired.

As mentioned heretofore, the next best thing to the exclusive underground service for each building is the exclusive underground service for each block. Having provided a branch of an underground feeder cable to the interior of a block, there are two general methods of completing the distribution, which are subject to all manner of variations and combinations, and both of which are applicable to blocks which have and blocks which have not public alleys.

One, which is so well known as hardly to need description, consists in erecting a pole and terminating the feeder cable upon it, and swinging aerial service wires therefrom to the several houses; or perhaps a line of poles will be required, carrying either cross-arms and wires or an aerial cable, by means of which the service wires are connected with the feeder cable.

The other method consists of extending branches of the feeder along the rear walls of the buildings, back fences, etc., and mounting terminals at suitable locations, from which service wires, in twisted pairs with a specially durable rubber insulation, can be carried in metal rings or screw eyes placed on the walls and fences, to each building. Without going further into details here each method has its own advantages, and while in general the method of rear wall and fence cabling and wiring is more economical where there are many telephones in the block, and the pole method more economical where there are few, no set rule can be given for making a choice of method; the local conditions in each block must be considered and the question settled on its individual merits.

Passing over without discussion the subjects of aerial cables and of the protection of cables from lightning and strong light and power currents, and electrolysis, I will merely mention an incident that occurred in Baltimore some months ago. The fuses protecting a cable terminal in the kitchen of a hotel were found to open the circuit without apparent cause; an investigation showed that the larvæ of an insect was harboring in the brass mounted end of the fiber tube which contains the thin narrow strip of metal forming the fuse proper, and this larvæ seemed to be causing the fuse to part in some manner. We thought we had discovered a new sensation in the shape of another lead-devouring insect, but an authority at the Department of Agriculture promptly identified the larva as that of a certain small scavenger beetle, and explained the entire phenomena by the opinion that larvæ only occupied the hole in the fuse mounting because it had seemed to the beetle a suitable place to deposit her egg.

WIRE.

There is not time now to go into the subject of pole lines, but a few words about wire may be of interest. In the early days iron wire was used exclusively for telegraph and telephone purposes. Steel was found to be far superior to iron in tensile strength, but with the increase in hardness there was also an increase in resistance, which was a serious disadvantage; the purer and softer the iron, the less its strength, but the greater its conductivity. But even the best of iron wire had two drawbacks: its resistance, when used between distant points, and its tendency to corrode, even though galvanized, when subjected to the smoky atmosphere of the cities. Copper wire did not have either of these objections, but besides being very costly, it was altogether too weak for use on pole lines. For very long telegraph circuits a so-called compound wire consisting of a steel wire, which gave the necessary tensile strength, with a strip of soft copper folded around it so as to form a concentric cylinder, was developed and used to some extent. But a little later the growth of the telephone industry was responsible for the development of hard-drawn copper wire, which, though inferior to steel and but slightly better than soft iron in tensile strength, is yet very satisfactory, and soon came into general use for both telephone and telegraph lines.

At the present time, for aerial subscribers' lines, No. 12 or No. 14 gauge copper wire is mostly used in the city, and in rural districts No. 12 iron is in very general use. For toll and long-distance circuits No. 12, No. 10 or No. 8 gauge copper is nearly always employed. For service wires, both in rear wall and fence distribution and in aerial spans, so called rubber-insulated twisted-pair wire has now been developed to a state which almost seems to approach perfection in its durability and reliability. A compound containing, I believe, something like thirty per cent of pure rubber, was long ago found to possess the necessary insulating and weather-resisting qualities, and at the same time was within reason in the matter of cost, but mechanically it was not sufficiently serviceable. A cotton braiding woven over the insulation gave it the needed protection, but the cotton was subject to rapid deterioration when exposed to the weather. The question then resolved itself into one of preserving the braiding from deterioration, and very satisfactory solutions of this problem have been reached in the present methods of filling or impregnating these braids.

The latest innovation in the way of telephone line wire is the new copper-steel wire which is coming into extensive use, both bare and in rubber-insulated twisted pairs. It is made by a patented process, by which a thin sheath of copper envelops and is thoroughly united to a steel core. It has some transmission advantage over steel or iron wire of the same gauge, and it combines the tensile strength of steel with the corrosion-resisting qualities of copper. Although the cost of copper and of copper-steel wire is about the same for equal lengths of a given gauge, the superior tensile strength of the latter makes it possible in many cases to use a much smaller gauge than with the former, with a consequent saving in cost.

As an evidence that there is no slacking up in the rapid advance of telephone science and art, I will conclude by calling attention to the striking fact that a comparatively few years ago the greatest distance for satisfactory conversation through cable was only something like 15 or 20 miles, so that a subscriber in Harlem or the Bronx, for instance, was going almost the limit when he asked for a connection to a friend in the southern part of Brooklyn; whereas to-

day a 92-mile stretch of underground conduit from Wilmington, Del., to Washington, is under construction and nearing completion, and the close of the current year will probably see the consummation of the enterprise—that is, the successful operation of an underground cable, loaded with Pupin inductance coils, normally handling all telephone conversations between Washington and Philadelphia and New York, and eliminating, or at least making practically negligible, the danger of Washington being cut off from communication with the outside world, as has repeatedly occurred in the past when severe sleet storms have wrecked all overhead telephone and telegraph lines.

Patent Confers a Monopoly

A far reaching decision upholding the right of patentees to dictate how their patented articles may be sold by retailers, and declaring legal the inventor's "monopoly" in his selling contracts, was made by the Supreme Court of the United States March 11.

It was a divided court ruling, for against this majority view, announced by Justice Lurton, three members of the bench—Chief Justice White and Justices Hughes and Lamar—dissented.

Attorney-General Wickersham, Solicitor-General Lehmann and a large assembly of lawyers were present in the court and apparently regarded the decision as epoch making.

Chief Justice White declared that congress should act to head off "untold evils" that would follow today's construction of the patent laws. He said that under the majority's ruling the patent laws could be stretched to include in a patent every conceivable thing used in every American household. The chief justice arraigned the majority opinion as breaking all precedents, the court in its past history never having failed to do its duty to the whole people and to stand as the protector of every household.

The case involved alleged infringement in selling supplies for use on a patented rotary mimeograph. A notice on the machine set forth that it was sold on the restriction that it was to be used only with supplies made by the patenting company.

In announcing the opinion Justice Lurton said this conclusion resulted from the proper construction of the patent statutes. The very object of this statute, he said, was to give a monopoly to the inventor, and the fact that he continues that monopoly in his contracts disposing of his articles by charging such price as he pleases was not illegal. If such conditions interfered with public policy, he said, congress alone must change the patent law.

National Association Elects Officers

March 11 the board of directors of the National Independent Telephone Association met in the offices of the association in the McCormick building, Chicago, and unanimously re-elected the old officers for the year. They are as follows: President, Manford Savage, Champaign, Ill.; first vice-president, E. B. Fisher, Grand Rapids, Mich.; second vice-president, W. J. Thomas, Shelbyville, Ky.; secretary and treasurer, Richard Valentine, Janesville, Wis.; assistant secretary and cashier, Miss N. Thompson, Chicago.

The executive committee is composed of the following members: Manford Savage, chairman; Theodore Gary, Macon, Mo.; N. G. Hunter, Wabash, Ind.; L. D. Kellogg and H. D. Critchfield, Chicago; Richard Valentine and E. B. Fisher.

The board of directors are supposed to meet every three months and during the meantime the executive committee will meet at the call of the president.

On taking up his duties for another year President Savage expressed himself in the following optimistic language:

"In accepting the office of president of the National Independent Telephone Association for another year, the present incumbent does so with a full knowledge of the responsibilities of the office. But this responsibility is made much lighter from the fact that it is shared by the directors, who are of the widest experience, of the utmost fairness and splendidly equipped to act in all matters connected with every department of the telephone business.

"It is the earnest desire of the board of directors and the officers of the association that the membership shall be so increased within the next few months that during the major part of the year we shall have a splendid body of earnest, enthusiastic telephone men working together for the common good. It cheapens the association and deprives its members of the benefits they might receive to have them join three days before the convention and give neither support nor encouragement during the other eleven months and twenty-seven days of the year. We should all join at the beginning and not at the close of the year.

"Again, the board of directors earnestly ask the advice and encouragement of each and every member of the association. We want a great, big, strong, democratic organization."

Illinois Independents in Convention

Twenty-five thousand telephones and property valued at more than a million dollars was represented at the fifth district convention of the independent telephone companies of Illinois at the Association of Commerce building in Peoria March 20. Some fifty delegates attended.

The fifth district comprises the counties of Peoria, Tazewell, Stark, Woodford, Mason and McLean. The objects of the gathering were to stimulate interest in the independent telephone business, to stimulate also the building of new toll lines and to extend the business generally.

C. H. Hood, secretary of the state association, was present as well as the representatives of the Kinloch system in St. Louis and the Illinois Tunnel Company of Chicago.

The extension of toll lines, in order to compete for this business with the Bell lines, is now engaging the attention of independent companies of Illinois to the exclusion of other business. The recent advent of the Inter-state Company into Chicago has encouraged them to believe that a great future is in store for the independent telephone business in Illinois.

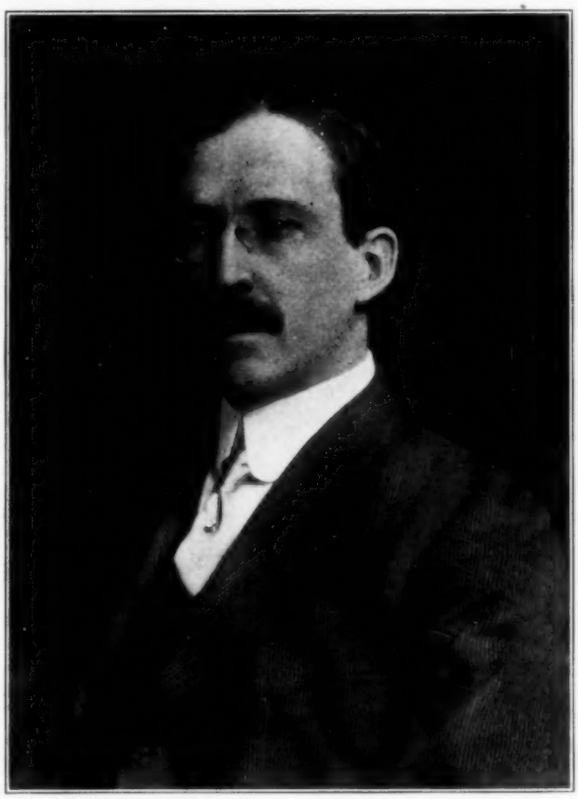
One of the things accomplished was the re-organization of the fifth district organization.

"Do us the favor of making our office the first place you lodge a complaint."

Who's Who in the Telephone Game

Facts and Fancies About a Man You Know or Ought to Know

HERE, then is where P. C. gets put over. If you ever get down on your back and lose out in the calendar to the extent of three weeks and then recover to the accumulation that sprawls itself in your deserted path, the thing to do is to do the best you can. This feature of this publication has become a fixture. It is as essential as the front cover. It is part of the book and the book must follow the solar system. The successful conclusion of an effort like this rests first and last in having a subject. P. C. is the subject this month, that's sure, but he doesn't know it. Moreover, why should he know it? If there is a telephone man anywhere who doesn't know P. C., will he please hold up his hand? Oh, there are many hands. Now for the rub. What do you know? Absolutely nothing except it is P. C., or probably "Patty." What is more, you are to learn very little more than that if you follow on. This much is certain—P. C. is a real, for-sure who's who in the telephone game, which you will allow is a fact and which he will concede is a game, and without quibble.



A Real, For-Sure Who's Who in the Telephone Game.

It so happens that D. J. and Catherine Burns were his parents and that he was born in Fon du Lac, Wisconsin, at an indeterminate time, probably not more than fifty nor less than, oh, say, forty-seven years ago. He never has told anybody, due perhaps to the old maid's reason, for be it known that P. C. is a bachelor. There ought to be something in common between old maids and old bachelors and this may be it. At any rate his parents named him Peter Cooper Burns. No mistake about that.

Before Mr. Burns began to make independent telephones, he was a manufacturer of porcelain products at Peru, Indiana, and it was while thus engaged that he put out a wet cell of the Le Clanche type. His success was immediate, and it will be remembered in passing that Mr. Burns was among the earliest of battery makers.

It isn't far from Peru to Kokomo, Indiana, and it isn't far from batteries to telephones, if you think of it. In 1893, Mr. Burns went to Kokomo and started to make telephones. He sent circulars everywhere announcing his plans and orders came with a rush. A factory was equipped in 1894 and the business was conducted over the name of Kokomo Telephone Company. In 1897 the American Electric Telephone Company was formed in Chicago and the Kokomo concern was absorbed. A year later the Keystone Telephone & Electric Company of Pittsburgh was consolidated with the American Company. In 1900 the Northwestern Telephone Company of Milwaukee, and the Victor Telephone Works of Chicago, were continued in the American Company, which is evidence enough that the telephone business, so far as the American and Patty Burns were concerned was bounding along.

It was about this time that the factory's large consumption of wire prompted an investigation into that branch of the industry and in 1901, the American Electric Company was taken over and the product of that concern was turned out in the Burns' plant.

Among the larger installations of Mr. Burns' company were Grand Rapids, Michigan; Topeka, Kansas, and Trenton, N. J. The splendid factory buildings and manufacturing equipment of the American Electric Company, together with its shipping facilities give it first rank among the independent makers.

Harking back to 1893 would place P. C. Burns in the pioneer class of independent makers. He has been consistently an independent. A few years ago when the independent manufacturers formed an association for some purpose or other, Burns was elected president. The last meeting of importance was held in the Knickerbocker hotel, New York, a little more than four years ago, but the bone of contention was buried about that time and independent manufacturers have been hustling without a leader ever since.

P. C. Burns is tall and angular; sits better than he stands and can wrap his long legs into the biggest twist you ever saw. It is worth traveling a long way to see him do this stunt. His reverse is truly artistic. He has always worn the glasses and the mustache that still adore his countenance. He has been the godfather of the old clan and never refused his friends anything that was reasonable for them to expect. If he might not be found in the conning tower of his fac-

tory there is only one other place to look—the Grand Pacific hotel, Chicago. There isn't anybody around the Grand Pacific who doesn't know P. C. Burns, for he has lived there almost continuously since he came from Kokomo.

Peter Cooper Burns likes the telephone business. He would be lost without it and the business will be lost just a day or two before he quits it. You can never lose him. He is a member of the Union League club, the South Shore Country club, and the Chicago Automobile club. If there is anything he likes better than his business, it is his car and the friends who share it with him.

He has always been the dominant factor in his enterprises. When orders are slow in coming in, he goes out to fetch. And it has been said that as a fetcher P. C. has the fetchingest ways of 'em all.

Telephone Rates in the Northwest

Consul Abraham E. Smith, Victoria, British Columbia, Canada, reports that there has been much discussion in Victoria in regard to the proposed increase of telephone charges by the British Columbia Telephone Company. The new rates for Victoria and Vancouver to go in effect April 1, 1912, are as follows: For unlimited telephone service to business houses a monthly rate of $5 net will be charged, an increase of $1 per month; for the man of small business who has few calls a rate of $3 for the first 100 outgoing calls will be made, and for each additional call a charge of 2 cents. The residence rates are $3 for individual and $2 for two-party lines, the same as before.

The long-distance charges are: From Victoria to Nanaimo, for first two minutes, 50 cents; each additional minute, 20 cents each. From Victoria to Cumberland, 90 cents for two minutes, and 40 cents each additional minute. From Victoria to Vancouver, 60 cents per minute. A consolidation of telephone companies is now in progress at Seattle, Wash., and under the new arrangement a flat business rate is made of $7.50 per month, and another of $5 for the first 100 calls and all thereafter at the rate of 3 cents each, and still another of $6 for the first 150 calls and 2½ cents for each call thereafter.

During the discussion incident to the advance in rates in this Province it was published that Portland, Ore., has a rate of $8 per month for unlimited business service. The measured service rate is $4 for 80 calls, 3 cents for each of the first 100 calls above that, and 2 cents for each call in excess of 180. Spokane, Wash., has a $6 flat rate and a measured rate of $4 for 80 calls, 3 cents for the first 100 excess, and 2 cents for each call above that. Tacoma, Wash., has a flat rate of $6 and a measured service rate of $4 for the first 100 calls and 2 cents each for each call therafter.

A report on telephone companies operating in Canada, submitted to the Dominion Parliament by the Minister of Railways, shows a total capital liability of 537 companies amounting to $40,943,982, of which $21,527,374 is represented by stock and $18,516,608 by funded debt. The cost of telephone plant and property in Canada is placed at $34,737,527. The gross earnings reported for the year were $19,968,220, and operating expenses were $6,979,045. Net earnings were $3,089,174. The statement of the Bell Telephone Company of Canada, Ltd., shows a capital of $12,500,000, funded debt of $4,899,999 cost of property and equipment of $21,251,370, revenue of $5,968,932 and operating expenses of $4,023,262. It also shows 426,545 miles of wire in operation, including 1,700 miles of submarine cable and 7,057 employes.

Texas Autoists to Have Telephones

With officers of the Dallas Automatic Telephone Company, C. H. Verschoyle of Dallas, Texas, has taken up a proposition of providing telephones on telephone poles about every half mile on the highways between Dallas and Denison on the north, Dallas and Fort Worth on the west and Dallas and Waco on the south. The purpose is that these telephones may be available for the use of automobilists who traverse these routes, and who, in an emergency, may desire to communicate with a physician, their homes or, in the event of a breakdown, may want to call for help. The telephone officials informed him that their wires are along the highways mentioned and at an early date they will make some definite proposal. When this is done, Mr. Verschoyle says he will submit the matter for action by the Automobile Club.

Such a system as is proposed for North Texas exists in Southern California, where it is successfully and satisfactorily used.

Nickel a Day Service Unprofitable

Telephone service to more than a hundred thousand "nickel a day" subscribers in Chicago is being furnished at a loss, according to the annual report of the directors of the Chicago Telephone Company recently issued by President Bernard E. Sunny. One of the causes for the loss to the company on this class of service is the moving habit of Chicago flat dwellers. At present the company makes no charge for moving telephones after they have been installed a year. As a result the company at the moving seasons is compelled to remove and reinstall thousands of telephones. Besides receiving nothing for this work the company loses the revenue of the telephone while they are being moved. During the last year it cost the company $730,107.20—almost three-quarters of a million dollars—to move or remove telephones, the majority of them being the "nickel a day" type.

Odd Facts from the Census

Eight million miles of wire added to American telephone systems in five years.

Iowa, Nebraska, Washington, Nevada and California lead the states in number of telephones to population.

Texas sends more messages per capita than New Jersey; Utah is ahead of Pennsylvania.

Cleveland is the city with the most telephones to every thousand inhabitants; New Orleans the least.

In Chicago the company has 60,000 requests daily for the time.

Busiest hour on the telephone exchange is between 10 and 11 a. m.; busiest day in the year, the day before Christmas.

Five office buildings in New York have telephones enough for a city of 100,000 people.

Poles Purchased in 1910

Government Report

AS in preceding years, the statistics concerning the number of wooden poles purchased in 1910 were compiled from reports secured by correspondence with the concerns using them.

The total number of poles purchased in 1910 was 3,870,694. Although this is the largest total ever recorded, it is only 131,954 greater than in 1909. The increase reported for 1909 over 1908 was much greater, amounting to 489,586 poles. The number of poles purchased each year from 1907 to 1910, inclusive, is shown by species in Table 1.

TABLE 1—POLES PURCHASED, CLASSIFIED BY KINDS OF WOOD; 1907 TO 1910.

	Poles Purchased (Number)			
Kind of Wood—	1910	1909	1908	1907
Cedar	2,431,567	2,439,825	2,200,139	2,109,477
Chestnut	677,517	608,066	516,049	630,282
Oak	265,290	236,842	160,702	76,450
Pine	184,677	179,586	116,749	155,960
Cypress	75,459	77,677	90,579	100,368
All other	236,184	196,744	164,936	210,731
Total	3,870,694	3,738,740	3,249,154	3,283,268

The demand for wooden poles, now amounting to nearly 4,000,000 annually, is supplied principally from three different sections of the United States, the northern white cedar region of the Lake states, the chestnut region of the eastern portion of the United States, and the western red cedar region of the Northwest, including Idaho, Washington, and Oregon. Southern white cedar, or juniper, is found mainly in North Carolina, Virginia, and New Jersey. At present the largest part of the cedar used is cut in the Lake states, but the indications are that the Northwest will be called upon to supply a constantly increasing proportion.

The qualities most desired in a pole timber are durability, strength, lightness, straightness, and a surface which will take climbing irons easily. The various species of cedar combine these qualities in a high degree.

Next to cedar, chestnut, oak, and pine were the leading woods drawn upon. The demand for these four species grows greater each year. Over 80 per cent of all poles reported were of cedar or chestnut, cedar alone supplying nearly 63 per cent of the total. The number of cedar poles increased slowly during the last few years up to 1909, but shows a slight decrease in 1910. The use of chestnut poles fell off considerably from 1907 to 1908, but since the latter date has again increased.

The number of oak poles purchased shows a heavy increase throughout the period covered by the table, the number purchased in 1910 being more than three times that reported in 1907. Various species of oak are utilized in different parts of the country, the more durable varieties of the white-oak group being preferred. The number of pine poles has shown a slight increase for each year except 1908. Several species of southern yellow pine are used to considerable extent, principally in the southern states. In the West another species, the western yellow pine, is reported. The latter is seldom used for poles without preservative treatment.

*From the annual federal report on the statistics of forest products, compiled through the co-operation of the Bureau of the Census in the Department of Commerce and Labor and the Forest Service in the Department of Agriculture.

The number of cypress poles purchased seems to be falling off, the number reported for 1910 being only about three-fourths as great as in 1907. Cypress poles are cut only in the southern states, mainly in Arkansas and Missouri. The use of Douglas fir in the Northwest is growing rapidly. Over 56,000 Douglas-fir poles were reported in 1910, as compared with about half this number in 1909 and less than 16,000 in 1907. Poles of several other kinds of woods were purchased in quantities of less than 50,000, of which tamarack, redwood, osage orange, spruce, and juniper were the most important. More than a dozen other woods were utilized to a relatively small extent.

The telephone and telegraph companies, which are the principal consumers of poles, reporting 73.2 per cent of the total number used, purchased 84,195 fewer poles in 1910 than in 1909. The electric railroad and electric light and power companies, on the other hand, purchased 105,678 more poles than in 1909, while the steam-railroad companies purchased 110,471 more poles than in the preceding year.

In Table 2 the purchases of poles in 1910 are classified by length for the principal kinds of woods.

TABLE 2—POLES PURCHASED, CLASSIFIED BY LENGTHS AND BY KINDS OF WOOD; 1910.

	Poles Purchased (Number, by Lengths)					
Kind of Wood—	Total	Under 20 feet	20 feet and over, but under 30 feet	30 feet and over, but under 40 feet	40 feet and over, but under 50 feet	50 feet & over
Cedar	2,431,567	302,131	1,527,953	463,494	113,629	24,360
Chestnut	677,517	29,764	331,725	254,874	50,869	10,285
Oak	265,290	157,898	88,127	12,959	4,870	1,436
Pine	184,677	62,394	74,345	33,134	9,451	5,353
Cypress	75,459	10,464	37,202	21,954	4,451	1,388
All other	236,184	79,308	128,099	21,354	5,866	1,557
All kinds	3,870,694	641,959	2,187,451	807,769	189,136	44,379

Poles are classified commercially in 5-foot lengths and by diameters at specified points. For the purposes of this report poles are divided into classes differing in length by 10 feet, as shown in the table.

More than one-half of the poles purchased are from 20 to 30 feet long, this being the length most commonly used by the telegraph and telephone companies. About one-fifth are from 30 to 40 feet in length and one-twentieth from 40 to 50 feet. Only about 1 per cent of the poles purchased exceed 50 feet in length. Cedar was the preferred wood for all lengths, and, in fact, in every class shown in the table, except that of poles less than 20 feet in length, cedar poles constitute more than one-half of the total. Poles of less than 20 feet in length are used largely by the rural telephone companies, which report a considerable variety of woods, prominent among which is oak.

The increase from 1909 to 1910 in the total number of poles purchased was 3.5 per cent. The largest increase for any of the several classes was that for poles over 50 feet in length, 23.5 per cent, and the next largest that for poles from 40 to 50 feet in length, 16.9 per cent. A slight decrease is reported for poles from 20 to 30 feet long.

Since the quantity of wood used for pole-line accessories is not reported for 1910, it may be interesting to note that the statistics gathered in 1909

show the purchase in that year of 3,508,695 cross arms, 6,167,795 brackets, and 18,463,041 insulator pins. Cross arms are made principally of Douglas fir and pine, brackets of oak, and insulator pins of locust.

PRESERVATION.

The great waste occasioned by the rapid decay of woods when in contact with the soil is very apparent in the case of poles. For a number of years past experiments have been carried on by private parties and by the United States Forest Service with a view to finding and perfecting methods of preventing such decay, and it may be stated that it is possible, through the proper application of certain preservatives, to increase the life of a pole from 50 to 100 per cent. The practice has proven a success economically. Not only does it lengthen the life of the pole, but it makes possible the utilization of many cheap local woods which without preservative treatment would be valueless for the purpose, thus reducing the cost of poles and transportation charges. In the principal European countries the practice of pole preservation is much more common than in this country, nearly every pole receiving a penetrating treatment with some preservative before being set. The economy of the process has been so well established that as it becomes generally understood the percentage of treated poles reported in the United States will no doubt rapidly increase and the methods used become more effective each year. The preservatives most commonly used are creosote oil, a solution of zinc chloride, and various proprietary preparations, usually antiseptic oils of low volatility.

The increase in the practice of really effective pole preservation in the United States has been retarded by the lack of pole-treating apparatus applicable to the needs of the small consumer. As a result, poles have been treated mainly by methods which do not require the use of a special treating plant and which add but few years to their service. The usual method is that of painting the lower end of the pole with the preservative.

A somewhat more effective method is that of dipping the pole in an open tank containing the preservative. By this operation all seasoning checks are thoroughly penetrated. A variation of this method is to stand the poles upright in a bath of the preservative, making the wood of the butt end of the pole decay proof by the absorption of large quantities of the oil or solution, through the action of a partial vacuum in the wood cells created by the alternate raising and lowering of the temperature of the bath. Satisfactory plants have been devised for this purpose which are economical for firms using considerable numbers of poles annually. A plant of this type and of large capacity was built during the year in California for the treatment of western yellow pine, western red cedar, and other local woods.

In parts of the South conditions are so favorable to decay that it is desirable to treat the entire pole, and both commercial and private plants have been established for this purpose. The poles are placed in a closed cylinder and absorption of the preservative is secured by the use of pressure. Large numbers of pine poles have been treated by this method, which is found to be the most effective now in use.

The number of poles which were treated before or after purchase from 1907 to 1910 by the concerns reporting is given in Table 3.

TABLE 3—POLES PURCHASED ALREADY TREATED OR TREATED AFTER PURCHASE; 1907 TO 1910.

	Poles Treated (Number)			
	1910	1909	1908	1907
Treated before purchase	166,211	126,711	101,998	106,781
Treated after purchase	658,462	449,920	242,390	289,418
Total	824,673	576,631	344,388	396,199

The table shows a continuous and rapid growth of the practice of treating poles. In 1910 some form of preservative treatment was administered to nearly 825,000 poles, or 21.3 per cent of the total number purchased. This is an increase of 248,000 over the number treated in 1909, and of 480,000 over the number treated in 1908.

By far the larger part of the treated poles were treated after purchase, the increase in the number treated after purchase during the past few years being much more rapid than that in the number treated before purchase. The electric railroad and electric light and power companies have been especially active in pole preservation. These companies treated nearly 30 per cent of their poles, while the telephone and telegraph companies, and the steam-railroad companies each treated less than 20 per cent of their poles. These percentages indicate a large gain for each class of purchasers except the steam railroads, which treated 31.1 per cent of the poles purchased by them in 1909.

Reports to the Forest Service in 1910 from 71 commercial and private timber-treating plants show that 457,352 linear feet of pole timbers, or the equivalent of 18,294 poles 25 feet long, were treated in closed cylinders under pressure. Four plants failed to report on this subject. This total is only about 40 per cent of that for 1909, when 1,123,000 linear feet were reported. Most of this timber was southern yellow pine treated in southern plants. Although some of these poles were treated with a solution of zinc chloride, by far the larger part were impregnated with creosote oil, from 6 to 20 pounds being used per cubic foot of timber. In co-operation with private firms the Forest Service has conducted experiments in pole preservation and now has a number of long pole-lines under complete record. From the data thus collected the comparative life of various timbers treated by different processes is being determined.

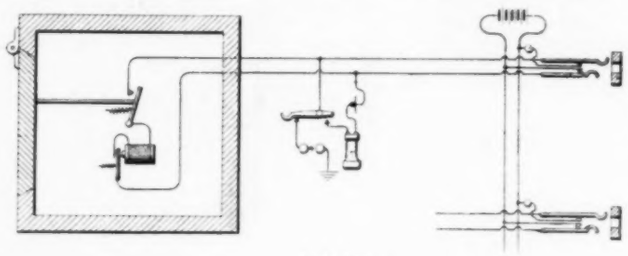
Although the number of treated poles reported is growing rapidly each year, most of these poles receive a merely superficial treatment which adds only a very few years' service. The figures for 1910 indicate that a larger proportion of the poles was treated during that year by the brush and open-tank methods than in the preceding year. Future progress in pole preservation should show not only increases in the number of poles treated but an increasing use of the more effective methods of preservation.

A private long-distance telephone system is one of the novel operating features of one of the large Michigan automobile manufacturing companies. This company, with its general office in Detroit, has plants at Flint, Lansing, Saginaw, Jackson, Pontiac and Owosso, and all are in direct private-wire communication with each other and the general office. A total of 370 miles of wire was used in connecting the plants with the central exchange, located in the general office in Detroit.

Recent Telephone Patents

By David S. Hulfish

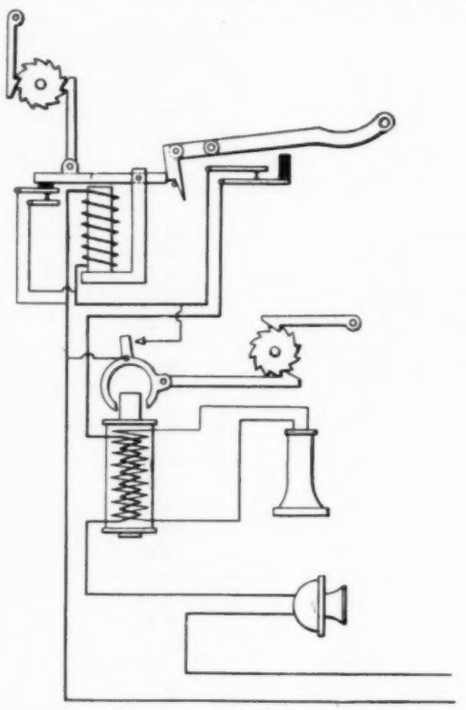
1,012,699. Telephone Alarm System for Coin Boxes. Arthur E. Paige, Philadelphia, Pa. The object is to place a burglar alarm upon a paystation box at a telephone station to report the opening of the box by automatic signals sent to the telephone central office. A buzzer is arranged within the coin box; when the box is opened the buzzer



1,012,699.

closes a circuit to light the signal lamp at the central office, and also announces by the buzzing sound that the call is from the coin box rather than from the telephone set.

1,012,780. Telephone Service Meter System. Charles S. Winston, Chicago, Ill., assignor to Kellogg Switchboard and Supply Company, of same place. A registering meter or counter is installed at the central office in connection with each telephone line. The feature of improvement is found in the supervision of the meter. The action of recording



1,012,793.

upon the meter is not made automatic, but a lamp signal is provided which lights when the record should be made, and the act of operating of the meter extinguishes the signal lamp.

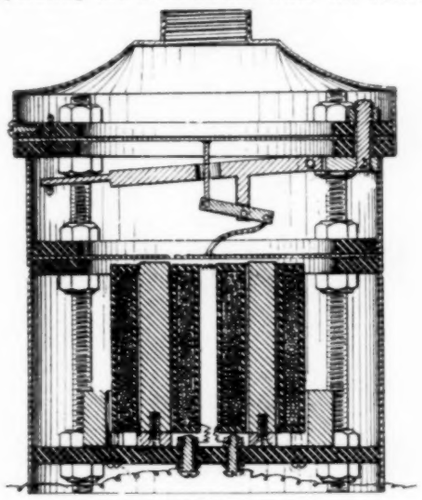
1,012,793. Telephone Service Meter System. Garrison Babcock, Rochester, N. Y., assignor to Telechronometer Company, of same place. In this system, each telephone has two meters at the substation, one meter counting the number of connections or calls which are made to the central office, and the other meter recording the total amount of talking time for which the telephone has been used. By reading the two meters, and in accordance with the service contract between the telephone company and the telephone user, a proper bill may be made for the service which has been rendered.

1,012,854. Sound-Intensifier for Telephones. William Hoppie, Ogden, Utah, assignor of parts to William Counts, Spark, Nev., and A. G. Horn, Ogden, Utah. In a receiver, two diaphragms are provided, one for the magnets and one for producing the sound waves of received speech currents, the two diaphragms being connected by a system of levers whereby the acoustic diaphragm has a greater movement than the magnetic diaphragm.

1,012,865. Telephone System. Arthur Koehler, Chicago, Ill. A combined system for telephone lines and burglar alarm.

1,012,919. Attachment. Irving S. Rosenblatt, San Francisco, Calif. In this antiseptic mouthpiece, the funnel is provided with a perforated closure at the outer end, and the entire interior of the funnel is packed full of sterilizing substances.

1,013,112. Attachment. George L. Bennett, New York, N. Y. A device for supporting the receiver of the telephone set, for operating the hook switch when the receiver is not



1,012,854.

in use, and for adjusting the receiver to any desired position when it is in use.

1,013,412. Party-Line Telephone System. Alexis Marchand, Bridgeport, Wash. This patent presents a specific arrangement of parts in a system for party lines in which the talking bridges of the telephones normally are not connected to the talking circuit, there being at each station a calling device by which any two telephone stations may be bridged across the talking pair of wires of the line.

1,013,865. Telephone System. W. W. Dean, Chicago, Ill., assignor to Kellogg Switchboard and Supply Company, of same place. Application filed July 5, 1901. The invention pertains to the line signal of a switchboard, and the circuits and apparatus for extinguishing it when the call is answered by the operator. A low resistance relay in the cord pair shunts out the signal of the line, thus avoiding the necessity of a cut-off relay for each line.

1,014,125. Harmonic Ringer. Edward B. Craft, Hackensack, N. J., assignor to Western Electric Company, New York, N. Y. In this ringer, the armature is suspended by a yoke upon the core ends, the adjustment of the yoke to the core ends being by threads upon the cores, the cores being

able to turn inside the coils of wire to attain the required adjustment.

1,014,268. Combined Transmitter and Receiver. William Barber Thompson, North Conway, N. H., assignor of one-half to Arthur E. Kenison, of same place. Within one box there are arranged the carbon cell and its diaphragm and the receiving pair of magnets and their diaphragm. One funnel is used for both diaphragms, the two being near each other, and the one nearer the funnel being smaller than the other, thus providing clearance for sound waves.

1,014,492. Telephone Cabinet or Hood. George W. Lancaster, Richmond, Va. The hood is formed with a housing substantially rectangular, with a rounded bulged portion on one side having a neck opening beneath it. The telephone instrument is within the hood, and the speaker's head is placed within the hood when speaking.

1,014,634. Conversation Counter for Telephones. Kurt Born, Kreuzberg, Germany. In this system of counting telephone calls, the call counter is placed at the telephone and is operated by the telephone hook lever as the hook rises when the receiver is lifted. The inventor desires to have the counter record a call each time the receiver is lifted for a call, but not to record in case the receiver is lifted in response to the ringing of the telephone bell. To accomplish this, he arranges a latch between the hook lever and the call counter, and arranges an unlatching device which is operated when the bell is rung, thus permitting the hook to be lifted without registering, the latch being restored when the hook is depressed.

1,014,796. Lightning Arrester and Test Device. Henry E. Wirt, Lewiston, Minn. A convenient arrangement of springs and binding posts upon an insulating base, for connections between the line wire and the house wire of a telephone line, providing both arrester features and test connections.

1,015,034. Telephone Set. John Lapicki, DeKalb, Ill. A telephone set in which the transmitter is attached to an upright portion, and the receiver is attached in swiveled manner to a frame which is pivotally held upon the upright. In this manner, the receiver takes a comfortable seat against the ear of the telephone user without being held by the hand.

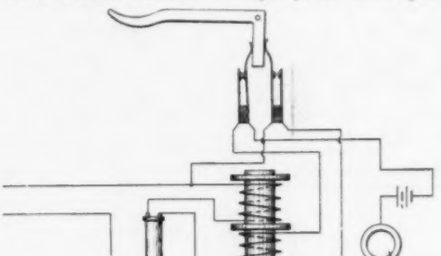
1,014,634.

The hook switch contacts are in connection with the swinging frame which supports the receiver.

1,015,255. Telephone Circuit. David H. Wilson, Chicago, Ill., assignor to Stilwell-Wilson Company, New York, N. Y. Filed August 7, 1903. A patent referring to a specific arrangement of induction coil windings and receiver and hook switch contacts. The transmission of speech is by local battery.

1,015,280. Telephone Toll Collecting Apparatus. Edward P. Baird, Chicago, Ill., assignor to Baird Manufacturing Company, of same place. Filed July 22, 1901, renewed June 16, 1911. In the operation of this improved device, the coin is deposited before the service has been rendered by the telephone company, the coin passing into a distributer from which it may be returned to the user if the service be not rendered, or may be passed into the cash box if the service be rendered. The feature of invention is in that the coin may be reclaimed by the depositor without the co-operation of the telephone operator, provided no conversation has been held, but not otherwise.

1,015,317. Dry Cell. Frank J. Humel, Cleveland, Ohio, assignor to National Carbon Company, of same place. The



1,015,255.

dry cell has a hollow, perforated central electrode, through which moisture may be poured into the cell, and it has also porous shelves buried in the battery mix between the central electrode and the wall of the battery cup.

1,015,414. Telephone Repeating System. Charles Adams-Randall, New York, N. Y., assignor to Randall Telephone Manufacturing Company, Augusta, Maine. At the repeating station of the telephone line, there are voice-current relays,, a set to operate in either direction over the line, and also circuit switching relays which make either of the voice-current relays effective, the circuit-switching relays being controlled by push buttons at the telephones connected for conversation.

Illinois Cities Entitled to Pole Fee

The right of a municipality to collect a license annually from telegraph and telephone companies for the use of its streets has been upheld by the Illinois Supreme court which affirmed the decision of the Sangamon circuit court in the case of the City of Springfield vs. The Postal Telegraph and Cable Company. The court says the imposition by a city of a charge on telegraph and telephone poles is not a tax, but is a license imposed by the city in the exercise of its police powers. The case was stubbornly fought by the telegraph company on the ground that it is a corporation chartered under the federal laws and not subject to taxation by a municipality.

Some years ago the City of Springfield passed an ordinance requiring telegraph companies to pay an annual rental of $1 for each pole located in the city. The license was not paid and the city brought suit to collect it. Judge Creighton found for the city in the circuit court and entered a judgment against the defendant for $640. The case was taken to the appellate court where the judgment was affirmed and now the supreme court has upheld the opinions of the lower courts and the judgment stands.

Owing to the likelihood of other municipalities throughout the state adopting ordinances similar to that in force in Springfield, the case has attracted much interest and the outcome is highly important to the telephone and telegraph companies, not only of Illinois, but of the entire country as well. If every city in the United States, taking advantage of this decision, should adopt such an ordinance, the effect would be very great financially to the companies and would no doubt result in all wires in cities being placed in underground conduits.

Summary of A. T. & T. Annual Report

For the Year of 1911

THE growth of the Bell system, its broader usefulness and resulting prospertiy, are shown in the annual report of the American Telephone and Telegraph Company for 1911 by the financial statement and other comparative statistics. In addition to this usual information, President Vail has made a very comprehensive statement of the policy of the company both in the management of its business and in its relations to the public.

The growth of the system is indicated by an increase of 749,906 in the number of stations, making a total at the end of the year of 6,632,625, of which 2,158,454 are operated by connecting companies. The Bell toll lines now reach 70,000 places, which is 5,000 more than the number of post offices and 10,000 more than the number of railroad stations in the United States. The total wire mileage has been increased to nearly 13,000,000 miles, of which over half is underground, and the new 450-mile subway between Boston and Washington has been completed except for the drawing in of some of the cable. The traffic over the Bell lines shows a daily average of 24,129,000, or at the rate of 7,770,000,000 connections a year.

Comparison of the total telephone, telegraph and first-class mail traffic of the United States and of Europe, shows that telephone conversations are 58 per cent of the whole in the United States and only 23 per cent in Europe.

There was spent in plant additions $55,660,738, as against $53,582,800 the year before. Estimates for the current year are $56,000,000. There was applied to maintenance and reconstruction during the year $58,840,000, making a total provision for the last nine years of $342,300,000.

Mr. Vail explains the company's policy in this regard, showing that sufficient appropriations are made to keep the plant at the highest possible efficiency.

In order that there may be no misunderstanding as to the conservative policy of the company in regard to returns and reserves, Mr. Vail makes the following statement:

> Except where in the extension of business extraordinary risks are taken which entitle them to some extra profit in consideration of such risks, or the net returns have not been sufficient to make an adequate return, if any, on the capital, the American Telephone and Telegraph Company and associated utilities controlled by it are and will be satisfied with reasonable average returns on their outstanding obligations, which compared with other business investments should be about 8 per cent., and will not expect or encourage any expectation of more than this; and in those excepted instances above referred to, they will only ask for that reasonable return which any equitable commission or court would award them. * * *
>
> The only sound conclusion that can be reached after full consideration of all the various phases and factors of the problem is, that ample reserves should be provided to meet not only probable happenings but possible happenings, and that such reserves should be so invested that whatever increment or revenue is to be derived from the amounts unexpended or not used for the purposes intended will go to the public in reduction of charges for or in improvement of, service, and that the value of a public utility plant should be represented by a relatively small percentage of outstanding securities calling for fixed charges.

The report shows the satisfactory co-operation of the legal department with the public service commissions. Another new feature is a brief summary of the important work done by the general engineering staff at the headquarters for the benefit of the associated companies throughout the United States. The results are shown in extended transmission, better service and economies of very great importance. It also speaks of the rearrangements of the associated companies so as to secure greater efficiency and economy because of their closer conformity to geographical and commercial requirements of the country. It is clearly brought out that the requirements of telephone service demand not only the local responsibility of these companies but also co-operation between them, and that the centralized general administration of the American Telephone and Telegraph Company is necessary both for economy and uniformity.

In speaking of the closer relations with independent and opposition companies, Mr. Vail reaffirms the statement of policy made early in the year, that if an independent company is purchased or merged its connections will not be cut off, and that such changes will result not in decreased facilities but in increased facilities.

PUBLIC RELATIONS.

The report says:

We believe, and we think that the public is fast coming to believe:

> That telephone service to be perfect must be universal, intercommunicating, interdependent under one control, and that no isolated section can be considered independently of any other or of the whole system, and that rates must be so adjusted as to make it possible for everyone to be connected who will add to the value of the system to others.
>
> That the highest commercial value of the telephone service depends on its completeness, on the extent and comprehensiveness of its possibilities of intercommunication not only between individuals but between aggregations of individuals, *i. e.*, communities.
>
> We believe that we are working this problem out on the broad lines of the greatest benefit to the public, and that this is evidenced by the fact that our standards and lines of organization and operation are the standards the world over.
>
> As a corollary to this—we recognize a "responsibility" and "accountability" to the public on our part, which is something different from and something more than the obligation of other public service companies not so closely interwoven with the daily life of the whole community.
>
> But, in admitting this responsibility and accountability on our part, we must insist that the measure of it shall not be determined by impossible standards, that equity and fairness shall be, and personal and political exigencies or partisan advantages shall not be the basis of judgments and requirements.

The report states that the relations with permanent bodies of control and regulation during the past year have been very satisfactory, and draws a comparison in favor of permanent commissions as against temporary committees.

As to government ownership, the repor tsays:

> The discussion of the government ownership of the wire companies is not likely to become anything more than academic, at least for the present.
>
> Even if the final conclusion should favor government purchase of all wire plants, there would be no unfavorable consequences to the shareholders of the wire companies other than the obligatory liquidation. Any possible award for the property which the security holders would be obliged to accept would give them better than current prices for their securities.

It is stated that out of the whole population, comparatively few use the telegraph or would use it under any conditions, as the telegraph can never take the place of the mails. If rates were reduced under government ownership it would be at the expense of the general taxpayers. There is hardly a telegraph or telephone system in the world now operated by any government which shows a profit even under accounting methods employed, and not one that would not show a deficit under accounting methods obligatory upon private enterprise, as can be learned from the department report of any government telegraph system. Take the kind and quality of service, the extent of territories covered and the wages to employees, there is no service in the world cheaper than the telegraph and telephone service of the United States.

The report gives in some detail the reasons why better, broader and more economical service can be given the public through the co-operation of the telephone and telegraph systems.

There are possibilities fraught with all sorts of advantages to the public which can be put in operation as fast as physical changes can be made in the plant, but those of the greatest advantage, prudence would dictate postponing until after business "restrictions" are made clearer or more definitely interpreted.

FINANCIAL STATEMENT.

The report goes very thoroughly into the financial condition of the Bell system, giving more figures than ever before and explaining carefully the methods of accounting upon which the figures are based.

The gross revenue collected from the public in 1911 for telephone service by the Bell system—not including the connected independent companies—was $179,500,000; an increase of nearly $14,000,000 over last year. Of this, operation consumed $60,000,000; taxes $9,000,000 or 1½ per cent on the outstanding capital; current maintenance, $30,200,000; and provision for depreciation, $28,700,000.

The surplus available for charges, etc., was $51,600,000 of which $13,600,000 was paid in interest and nearly $26,000,000 was paid in dividends.

The total capitalization, including inter-company items and duplications, of the companies of the Bell system is $1,186,639,036. Of this $524,679,951 is owned and in the treasury of the companies of the Bell system. The capital stock, bonds and notes payable outstanding in the hands of the public at the close of the year were $662,000,000. If to this be added the current accounts payable, $23,400,000 the total outstanding obligations of every kind were $685,400,000, as against which there were liquid assets, cash and current accounts receivable, of $74,800,000, leaving $610,600,000, as the net permanent capital obligations of the whole system outstanding in the hands of the public.

Against these obligations, the companies had actual, tangible property, not including franchises, patents or good will, which cost $754,200,000, an excess of 23 per cent over the obligations.

It will be noted there has been a steady decrease in revenue per subscriber's station, so that now the average subscriber pays for a higher grade, more comprehensive service, less than half what he paid sixteen years ago for the much less useful service that was then possible.

The net earnings of the American Telephone and Telegraph Company for the year were $33,301,245.77, an increase of $1,368,031.28 over 1910. The interest charges were $5,567,980.30, and the dividends at the regular rate of 8 per cent were $22,169,449.79. Of the balance $5,563,815.68, there was carried to reserves, $2,800,000.00, and to surplus, $2,763,815.68.

The number of shareholders, 47,341, on December 31, 1911, shows an increase of 6,960 during the year, and increased to 49,011 on March 1, 1912. The distribution is general, there being 41,016 shareholders who hold less than 100 shares each, 5,971 who hold from 100 to 1,000 shares each, 324 who hold from 1,000 to 5,000 shares each and 30 who each hold 5,000 shares or more. The average number of shares held was 67. A majority of the company's stockholders are women. Less than eight per cent of the stock was at December 31 in the names of brokers.

Maryland Commission News

The Garrett County Telephone Company has filed complaint with the public service commission of Maryland against the Chesapeake & Potomac Telephone Company in which it is alleged that upon the purchase of the Western Maryland Telephone Company by the latter the contract relations existing between the Garrett Company and the Western Maryland Company were arbitrarily concelled by the purchaser, which worked considerable hardship on complainant. It is also charged that overtures were made for the purchase of the complainant company, but failing in this it is alleged the relations existing between the Garrett Company and the Western Maryland Company were immediately terminated by the new owner.

Oklahoma Commission News

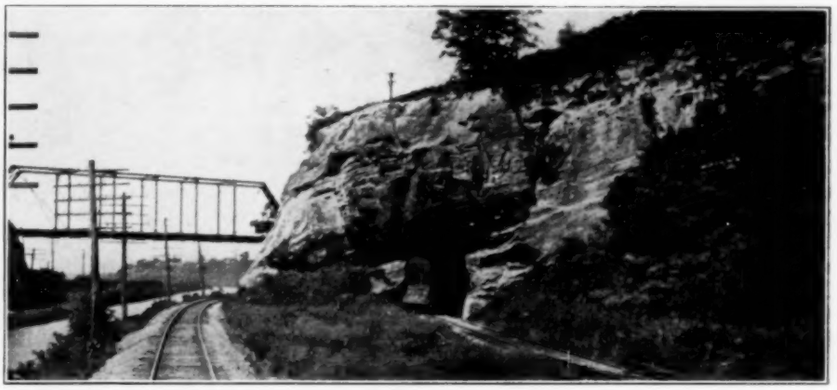
Concerning the telephone and telegraph service order recently issued by the Oklahoma Corporation Commission in which preference over other business is given the messages of certain state and county officials, the commission explained that such service would apply to sheriffs in pursuit of criminals and the companies affected expressed a willingness to comply with the order when they were assured the applicant was entitled to the service. It was agreed, however, that death messages should be given first place, sickness next and sheriffs or other officers in pursuit of criminals, next and that in many cases the nature of the message would determine its preference. Newspaper matter, when it must be rushed to reach its destination in time for publication, was given preference over general commercial business.

Oklahoma Association Convenes

The Oklahoma Telephone Association recently convened at Oklahoma City, at which time special attention was given the subjects of physical connection and competition. George A. Henshaw, of the Oklahoma Corporation Commission, was one of the chief speakers. He expressed himself as opposed to two exchanges in one city, believing it to be an unnecessary expense. In discussing the question of physical connection he stated the commission would in each instance act in strict accordance with the merits of the case, ever keeping in view the idea of eliminating duplication wherever possible.

The following officers were elected: President, R. S. Goffe, Sulphur; vice-president, W. J. Steele, Kingfisher; secretary-treasurer, Horace Truman, Geary.

DEPARTMENT of RAILWAY TELEPHONES



The Ruler of Lehigh Valley Circuits

J. F. Caskey, Supt. of Telegraph

WAPAKONETA, county seat of Auglaise county, Ohio, rejoices in a census return of 5,349 souls as of 1910. It has been mentioned by after-dinner speakers in communities of larger pretention as a well-laid-out town. But we all know that after dinner speakers will take big chances for a smile. Those who have stayed there long enough to notice it say that so far from having been laid out, Wapakoneta is some live town. The natives are of a kindly dispositon, and very proud when one of the home boys goes out into the big world and achieves fame and fortune.

J. F. Caskey, Lehigh Valley.

There is a little white cottage on a prominent street corner in Wapakoneta, and in that cottage was born one of those talented ones we mention. Years later, as he sat at his magohany desk in a metropolitan office, a friend entered who had, for some unknown reason, been forced to spend a day in the old town.

"Jim," he said, "Do you know what they have done to that little old cottage down home where you were born?"

Jim closed his eyes and it all came back to him—the modest cottage with its vine-covered porch, the rumble of traffic floating in at the open window from the busy street every time Bill Smith drove into town with a load of potatoes, the thrills of excitement occasioned by the passage of trains on the C. H. & D., or the L. E. & W.—and he asked quickly "What have they done?"

"They have put," said his friend impressively, "they have put a brass tablet on your birthplace."

Jim was touched. He felt that perhaps he had not paid enough attention to the old town in the whirl and bustle of his rapid rise, and he was deeply gratified that his early comrades had watched his success from afar and were proud of him. And after he had meditated awhile on the simplicity of greatness, he asked, humbly, what the inscription on the tablet might be.

"It says," replied his friend, "Main Street."

But our only real interest in Wapakoneta just now is due to the fact that J. F. Caskey was born there February 7, 1869. He was raised, however, at Mauch Chunk, Pa., where the raising is supposed to be better. Mauch Chunk is smaller than Wapakoneta, but it is higher. A good gazer can raise the Nescopek mountains, twenty miles to the northwest. They also raise coal in the neighborhood.

Caskey was 14 years, 3 months and 24 days old when he entered the service of the Lehigh Valley Railroad Company as a messenger boy. A simple calculation reveals the date as May 31, 1883. When he was not messenging he listened to the click click of the telegraph instruments—not idly, but with subtle intent. Passing over the familiar de-

Department of Railway Telephones

This department is established as a permanent feature of Telephone Engineer. The progress of the art of telephone train dispatching, its technical development, its news, and the elucidation of its mysteries for the non-technical worker will be found each month in these pages. The editors invite the problems and solicit the co-operation of the many readers of Telephone Engineer in all parts of the world whose interests lie along these lines.

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tails, it suffices to say that he soon acquired a practical knowledge of telegraph operating, and served as night operator first, then as day operator at Mauch Chunk. By 1890 he was manager of the Wilkes-Barre office. In 1891 he was transferred to Bethlehem, Pa., serving as chief clerk and wire chief for eighteen years full of experience. And July 1, 1909, he was appointed superintendent of telegraph of the Lehigh Valley Railroad Company, with headquarters at South Bethlehem.

J. F. Caskey is an active member of the Associatoin of Railway Telegraph Superintendents, and a regular attendant at its conventions. Aside from that he belongs to no clubs, and his hobby is work. For recreation he works some more. His office hours are January 1 to January 1, inclusive.

Telephone Dispatching on the A. G. S.

That a telephone dispatching system over the Alabama Great Southern division of the Queen & Crescent route is being considered by the directors of the controling company, the Southern Railway, along with a recommendation that certain parts of the Alabama Great Southern be double tracked, is the statement of W. S. Andrews, general superintendent of transportation for the Queen & Crescent route.

The telephone system has been recommended by the Alabama Great Southern operating department and will cost about $25,000 to install, according to Mr. Andrews. If passed upon favorably within the next few weeks the system will be installed in six months.

In addition to double tracking the Alabama Great Southern division, in line with developments that have already been made on the Cincinnati Southern, and installing the telephone dispatching system, the Alabama Great Southern will perform other improvements during the summer, it is stated.

"The installation of a telephone dispatching system over the Alabama Great Southern Railroad has been recommended and will, we hope, be passed upon within a short time," said Mr. Andrews. "The work, if passed upon favorably within a short time, may be installed in the course of a few months. It would cost something like $25,000. The system has been placed on the Cincinnati Southern and is far superior to telegraphing and in other ways more desirable. It saves an infinite amount of time, makes absolutely sure every message, and leaves no room for doubt as to any transaction. Instant communication may be obtained over the telephone wires. The railroads of the entire country are coming to see the superiority of the telephone service and there cannot be any doubt that eventually there will be little, if any, railroad system without such a dispatching system.

Telephones for Train Dispatching Increasing

The introduction of the telephone in the field of train dispatching still goes on with rapid strides. Its success has been emphatic and very gratifying to the officials on whose roads it has been installed.

The New York Central & Hudson River Railroad a month or so ago placed an order with the Western Electric Company for 45 telephone sets and miscellaneous supplies to be used in extending its system; and more recently placed a further order for 70 similar telephone sets, 54 transmitter arms, 30 portable telephone sets with the same number of line poles, 60 test panels and a considerable quantity of miscellaneous supplies.

In the West, the Davenport & Muscatine Railway Company, operating between Davenport, Iowa, and Muscatine, Ia., a distance of about 25 miles is installing a four selector and telephone way-station equipment, four selector semaphores and four siding telephones. In the South, another railway system to adopt the telephone is the Gulf, Florida & Alabama Railway, of Pensaloca, Fla., which has given the same company an order for equipment for 100 miles of line. The apparatus to be furnished consists of 20 selectors 15 siding sets, 12 portable sets and the necessary line material.

Other railroads in the East and South, so it is reported, are constantly sending in "repeat" orders. The Lehigh Valley will install a special yard dispatching circuit consisting of eight complete selector stations, and have also ordered 140 portable telephone sets with line poles. A total of 55 wall telephones and miscellaneous material for train dispatching circuits is going to the Norfolk & Southern Railroad Company, while the Norfolk & Western has ordered 90 adjustaphones (transmitter arms) with the necessary generator sets and miscellaneous pole line hardware for two dispatching circuits.

The Chesapeake & Ohio is steadily extending its telephone lines and has recently installed 46 additional desk type telephone sets with miscellaneous line material; and for use on the line between Columbus, Georgia and Birmingham, Ala., the Central of Georgia has ordered 30 portable sets and line poles. The Baltimore & Ohio will shortly install 35 additional way station outfits.

All in all, the past successes of the telephone in train dispatching are more than encouraging, and its future looms up brightly.

Gill Selectors on the N. & W. and the B. & O.

The United States Electric Company has delivered since the first of March 78 Gill selector local battery bell telephone train dispatching outfits to the Norfolk & Western Railway, together with the necessary sending keys. The Norfolk & Western had heretofore 175 of the Gill bridging selector outfits in service, and the satisfactory service rendered has led to the extension of the system.

The Baltimore & Ohio Railroad, which has had in service about 150 of the Gill outfits, has received from the United States Electric Company 41 additional Gill selector local battery bell train dispatching outfits and 35 local battery bell intercommunicating telephone selector outfits. An interesting feature of this message circuit is that the United States Company's universal calling key will be used in the intercalling service.

More Telephones for M. P.

Telephones to replace telegraphs for train dispatching and a block system between Wichita and Ft. Scott are improvements the Missouri Pacific will make this spring. Installation of telephones will follow a recommendation made by President Bush who, after inspecting telephone train dispatching, ordered it in on all Gould lines. Missouri Pacific officials believe that the block system is necessary for safety precautions. Stations will be placed in every town between Wichita and Ft. Scott.

Duplex and Quadruplex in Railway Work

By John A. Kick

I ONCE heard of a railway abandoning its quadruplex system of telegraphy because it was claimed that too much trouble was experienced in maintaining the equipment and wires in full quadruplex condition.

Taking a single wire capacity as a basis, a good quadruplex circuit is equal to four wires, and where the equipment is given attention the polar side at least is better than two single wires and will give more satisfaction.

The common side of a quadruplex is what you make and maintain it; that is, if the line wire is within the limits of good quad distance, then the question is one of upkeep, and the returns in added service surely justify first-class maintenance and attendance. If the line wire is so long as to make "fair weather" service only, then the old familiar phrase "you cannot get something for nothing" applies just as it does when you attempt to maintain multiplex equipment by having inferior quality of maintenance and attendance. A quadruplex properly installed and working on a wire well within the limits does not require a great amount of attention, but what attention it does need and receive must be from a skilled attendant.

There is usually enough business between the general headquarters and each division headquarters to require the full service of one or more single wire equivalents and since the usual string of way offices cut in on these circuits are unable to secure service, they had best be cut out altogether and the wire quadded or duplexed, thus multiplying the capacity by two or four.

In general it is more satisfactory to relay business for local points on any division at the main telegraph office on that division than to attempt a general direct service between all stations. For many reasons the method first mentioned is more satisfactory.

First: The through wires are decreased in resistance by the cutting out of office equipment at way offices which are rarely ever able to get the circuit long enough to raise anyone.

Second: The lag introduced by a circuit overloaded with relays is cut to a minimum.

Third: The circuit is made a deplex or quadruplex possibility, increasing the capacity two or four-fold.

Fourth: If desired, the through circuit may be quadded from division point to division point with the polar side cut through using the common side for business between the division points or cutting it through as required.

Fifth: There are many possibilities of half set repeatering of side line and branch circuits through over these quadded circuits, and while the initial installation will appear to call for added relay service there will eventually work out possibilities of off-setting this increase by using the added facilities for carrying direct the business formerly relayed from these circuits.

Sixth: If remaniing single but strictly through with no way offices, the maximum speed of operation is secured as a single wire. If duplexed and two-way service secured, a higher speed is made possible by reason of the "clearing out" feature of the operation of a pole changer as against a continued D. C. applied, which is the case under single wire operation. As the higher speed is possible both ways, it is clear that one wire duplexed will carry more business than two like single wires. If the distance is within the limit of a good quad, then the capacity is increased four-fold, as the latest type of quad equipment is of such efficiency as to allow the very highest speed of operation.

The question of determining requirements properly to handle the business is one that is not easily decided, and an attempted study of the proposition will result in a lot of detail work becoming apparent and bringing to notice the fact that there is a very important traffic feature to a well organized railway telegraph system. Some of these systems just grew up like Topsy, but the majority have and will ever require careful observation from the traffic end.

Portable Train Set as a Time-Saver

Wearying of the continued loss of time entailed by the inability of crews of stalled trains and of repair gangs to communicate with headquarters from places along the right-of-way, the Lehigh Valley Railroad has purchased in all over seven hundred Western Electric portable telephone sets during the past year. Each train unit is furnished with one of these sets, as is each bridge crew and each track repair gang. The officials of the road state, without reservation, that the purchase of these sets is one of the most profitable investments the company has ever made. They have more than paid for themselves.

One of the track repair gangs was sent out the other day with its first portable set. The gang consisted of forty men, whose business it was to replace worn rails. The "Black Diamond" express, the crack flier of the Lehigh Valley, was due, according to schedule, just about the time the track foreman was ready to replace several rails. Under the old order of things, the track foreman would have waited until the "Black Diamond," which had the right-of-way, had passed, before beginning work. Having modern methods at his command, he communicated, by means of his portable set, with headquarters and learned that the "Black Diamond" was two hours late on account of a snow-slide. Knowing this, the foreman went ahead with his work, made the rail replacement and had ample time to move on to the next place of operation before the flier thundered past.

It does not take long for many incidents of this character, numbers of which occur every day, to make the telephone more than pay for itself in enabling the track gang to work to the highest possible efficiency. The bridge inspector can report minor troubles to headquarters and have a repair gang start toward the scene of action in less time than he could formerly reach a signal tower. In an emergency, such as a wreck, the train crew can communicate immediately with the dispatcher and give detailed information concerning the

extent of the accident. The railroad officials can then with a minimum of delay arrange for the rerouting of trains and the hurrying of the wrecking and relief trains to the scene.

Some Questions Answered

TRANSMISSION STANDARDS.

The standard for long distance transmission is taken as equivalent to 30 or 32 miles of No. 19 gauge standard cable. Does this include not only the long distance line but switching trunks, local lines, and any miscellaneous apparatus connected on the speaking circuit? In other words, does it mean that the equivalent of the long distance line itself must not be more than 30 or 32 miles or must the whole speaking circuit, when 2 parties are connected to the long distance lines over local lines and switching trunks, not exceed this value?— J. C.

The standard of transmission of a line, meaning by this term how loud the transmission is, may be as high as 10 miles of standard 19-gauge cable, but should never fall below 30 miles. The entire circuit, that is, the toll line and connected apparatus at the central office, and local subscriber's circuit, should not be less than 30 miles. If the toll line itself is equal to 30 miles, the service will be unreliable. In speaking of the relative transmission efficiency of various kinds of telephone circuits and apparatus, it has become the custom to express this value in terms of No. 19 gauge, .054 mutual capacity (standard conference) cable. For example, if we desire to express how well a circuit of No. 8 B. W. G. open wire copper will talk, we say that about 29 miles of this circuit has a transmission efficiency equivalent to one mile of standard cable (19-gauge, .054 mutual capacity). In the same way, No. 22 B. & S. gauge cable has an equivalent of .63 miles to 1 mile of standard cable, No. 12 N. B. S. open wire copper an equivalent of 13 miles to 1 mile of standard cable, etc. Now one mile of No. 8 B. W. G. open wire copper will talk about the same as 1/29 of a mile of standard cable, or reduced to decimals, we say that the *transmission loss* due to one mile of No. 8 B. W. G. open wire copper is equal to .035 miles. The transmission loss of each portion of the circuit or each part of apparatus is figured in this way, and the circuit made of such size as will give transmission of the standard decided upon, after deducting the total of these transmission losses.

ACCOUNTING CLASSIFICATION.

Kindly advise us if it is proper to charge the cost of substation wiring in with our aerial line account. Would it be going too far to carry individual accounts for subscriber's drops, (from pole to house) inside wiring, and actual aerial line, whether in cable or an open wire line? Why is it desirable to carry each of these accounts separately?—B. T. C.

The most approved classification for the above accounts is one that is known under the general head of Subscriber's Station Equipment, with the following individual accounts: Station Apparatus, Installations, Drop Wires, Interior Block Wires, Private Branch Exchanges, Booths, etc. You will observe that this classification goes farther into detail than you have suggested. The amounts which are chargeable to depreciation, taxes, maintenance and interest (in other words, the annual charges), on the different portions of plant which go to make up the substation equipment vary so greatly that it is not desirable to include all these items in one account. The plant accounts should cover the following: Pole Lines, Aerial Cable, Aerial Wire, Underground Conduits, Underground Cable, Submarine Cable, Central Station Operating Equipment, Central Station Furniture and Fixtures, Station Apparatus, Installations, Drop Wires, Interior Block Wires, Private Branch Exchanges, Booths, etc., Right of Way. The above will ordinarily cover all the items which enter into the cost of the plant.

Wabash to Adopt Telephones

Telephone train dispatching is to be adopted by the Wabash Railroad. It was lately mentioned that the Wabash is to string 1,600 miles of new copper wire this summer, the wire to be put in between Chicago and St. Louis, Detroit and Decatur and St. Louis and Moberly. It now develops that telephones are to be put in at the same time this new wire is strung and before the year is ended will be used in train handling.

The exact sum authorized for this work was $100,000, but it is understood that an effort will be made to do the work for $15,000 or $16,000 under the authorized amount.

Some years ago estimates were made on telephonic train dispatching between Chicago and St. Louis, but nothing ever came of it, as the Wabash shortly afterward adopted a retrenchment policy. Where the telephonic system has been tried greater efficiency has been attained with no greater expenditure of money than where the telegraph intrument is used exclusively.

Seaboard Line to Install Telephones

It is announced by traffic officials of the Seaboard Air Line railroad that a telephone dispatching system will be installed on the Birmingham division of that line, costing $40,000, within a short time. The Seaboard has at this time a telephone system from Norfolk and Richmond to Raleigh, and proposes to place one from the latter point to Savannah to connect with the Florida points and one from Birmingham to Raleigh to connect up the entire system.

The day of telephone dispatching has arrived. Practically all of the lines into Birmingham have announced the coming of such means of communication. The system has proven so far superior to the old form of telegraphing, and such a time saver that other lines have taken up the new plans. The Seaboard three years ago started the telephone lines on the first district and is working south as fast as the appropriation can be secured.

Telephone Rates Abroad

In Austria the unlimited-service rate for areas with more than 20,000 subscribers is $81 a year. In Germany, the corresponding rate is $44, but the German Administration has stated that this rate is very unremunerative in the case of large users. In Switzerland all telephone service is given on a measured-rate basis. In London the unlimited-service rate is $83 a year, but this covers calls to distant parts of the area, which, in other countries, would be regarded as interurban or trunk calls, and for which special fees would have to be paid. Outside London, although there were many agreements in force at the obsolete unlimited-service rate of $49 a year, there has been no current unlimited-service rate for business connections since 1907, but for private residences there is still an unlimited-service rate of $39 a year.

Description of an Artificial Line

IN ORDER to demonstrate the leakage theory in general, and especially to show the possibility of employing wires of relatively high resistance for long lines, under conditions of high insulation, an artificial telegraph line was constructed with the following properties or constants, and was described by Frank F. Fowle in a paper entitled "Line Conductor Requirements for Telegraph Transmission," read before the convention of Railway Telegraph Superintendents.

It normally represents a line 500. miles long having a wire resistance of 10. ohms per mile and an insulation resistance per mile of 0.25 megohm. In order to make it approximate very closely to the corresponding real line, whose resistance, leakage and capacity are uniformly distributed, it is divided into 20 sections, each 25 miles in equivalent length. The wiring of each section is shown in Fig. 1. The sections are joined together in series, and arranged with cut-in jacks, so that various lengths less than 500. miles can be obtained for experiment. The leak resistance of 10,000 ohms provides the equivalent of 0.25 megohm per mile, for a 25-mile section. Then by throwing the switch A an additional leak resistance of 16,670 ohms can be inserted, making the total 26,670 ohms, or the equivalent of 0.667 megohm per mile.

The inductance of an ordinary telegraph line is small, and so far as it affects transmission in the present instance can be neglected. The electrostatic capacity of a No. 9 B. & S. wire, of any material, at a uniform height of 20 feet from the earth, would be 0.00990 microfarad per mile, if not in the presence of

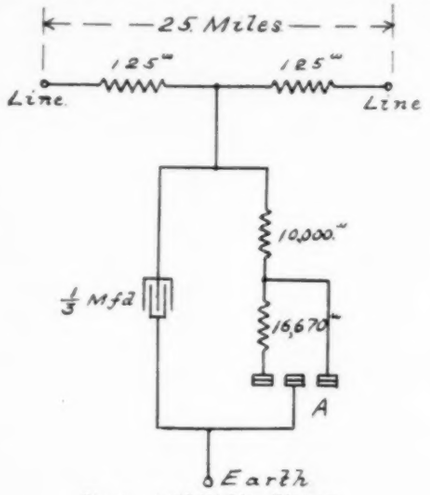


Fig. 1. Artificial Line Diagram.

other parallel wires. But the latter cause the true capacity to increase somewhat, depending on their number and proximity. A 25-mile section would require, on the single-wire basis, 0.247 microfarad, but a condenser with a nominal capacity of 0.3 microfarad has been used; the actual capacity is a little higher than the rating, however, being probably 0.33 to 0.35 microfarad and represents an increase over the theoretical requirement of 30 per cent. to 40 per cent.

The operative limit of such a line, with an insulation resistance of 0.25 megohm per mile, 00-ohm terminals and a value of n equal to 4.00, is 299. miles. But when the insulation resistance is increased to 0.667 megohm per mile, the limit is 505. miles, under the same terminal conditions. The essential purpose of this model is to demonstrate the facts just stated.

At each terminal there is a 150-ohm standard relay, a key and a sounder; also a 100-ohm resistance

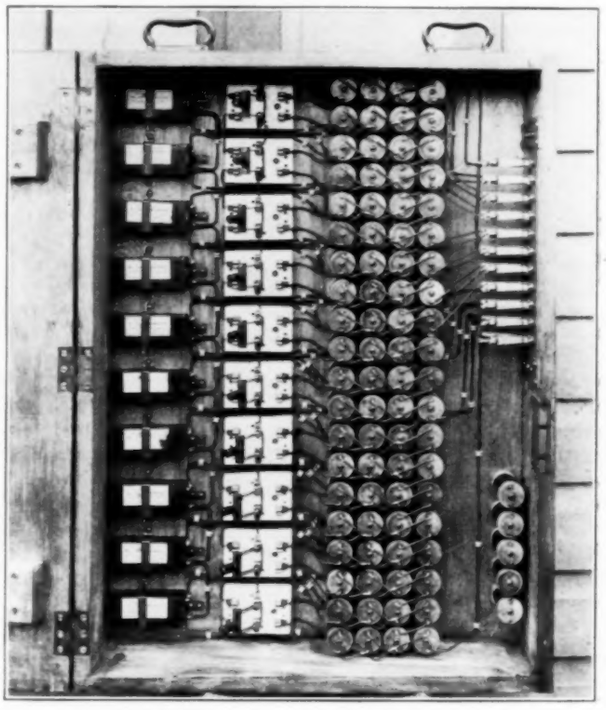


Fig. 2. The Artificial Line.

lamp. The total voltage required to produce a line current of 50. milliamperes, with no leakage, is 180. volts for 300. miles and 280. volts for 500. miles; this is distributed one-half at each terminal.

Fig. 2 is a photograph of the artificial line. The cabinet was 33 inches high, 24 inches wide and 5½ inches deep, inside dimensions. There were 40 spools of 125 ohms resistance each for the line resistance. Each spool was made of maple, shellaced, 1½ inches in diameter and 3 inches long with a winding space of 2 inches. Each was wound with 170 turns of No. 30 30-per cent. German silver wire and tested with 20 volts one minute.

Twenty spools of 10,000 ohms resistance each were for leak coils. They were wound with 9 layers of No. 36 30-per cent. German silver wire, 4½ layers in one direction and then reversed to be non-inductive, and tested with 200 volts one minute.

Twenty spools of 16,670 ohms each, also for leak coils, were wound with 14 layers, 7 each way, and tested with 125 volts one minute. Black enamel.

The jacks were arranged at 0, 200, 250, 275, 300, 325, 350, 400, 450, 475, 500 mile points.

Tests made with this line, before the convention at Boston, showed complete agreement between theory

and actual working. The line showed substantially that a No. 9 copper clad 40 per cent. wire with leakage of ¼ megohm per mile would work well for 300 miles, and with a leakage of no more than ⅔ megohm per mile the line worked 500 miles with equal efficiency. In the demonstrations a regular telegraph operator handled the key and sent real "stuff."

Telephones Installed on C. & O.

The new telephone system which has been in the course of construction along the line of the Chesapeake & Ohio Railroad Company for the past three months is completed and the lines have been connected up. These telephones will be used for train dispatching service in place of the telegraph. It has been demonstrated that the telephones are more quickly operated and are just as reliable as the telegraph, a number of the biggest roads in the country having operated their trains by telephone for a long time with complete satisfaction. It probably will be several days before the telephone lines will be in complete operation all along the line, but it is only a question of time until train dispatching by telegraph will be a thing of the past with the Chesapeake & Ohio.

The line was tested thoroughly at Marion, Ind., and placed in regular service. Whenever possible all train dispatching will be done over the telephone system, but the telegraph system will be pressed into service again in emergencies.

Of Interest to the Trade

By A. L. Haase

Iowa Independents in Convention

As we go to press there is being held in the Coliseum, Des Moines, Iowa, the sixteenth annual convention of the Iowa Independent Telephone Association, which, according to announcements, is to excel any previous convention, both in its program and in the extent of its exhibits. Every new and practical invention known to the art will be there. The program has been prepared with a view to making it most helpful, not only by the dissemination of knowledge, but by offering an opportunity for the exchange of ideas and the acquiring of new methods as well as the inspiration and enthusiasm which comes as a result of coming in contact with live, practical telephone men. Considering the extensive preparations the meeting is one which no live telephone man within reasonable distance could afford to miss and indications point to a record-breaking attendance.

As special educational features the committee has been able to secure C. N. Cadby, inspector of telephone and electrical service of the Wisconsin railroad commission, who gives an illustrated lecture showing the results of the commission's work, which is one of the live issues of the present day. Statistician Edwin Gruhl, of the Wisconsin railroad commission, has also been secured to give a demonstation of the system of accounting which will soon be required by the Interstate Commerce Commission.

Manford Savage, president of the National Association, is scheduled for an address on some live topic of the day and provision has been made for a technical and practical conference, also a question box where questions of importance to all may be discussed and views exchanged.

The exhibitors scheduled for the convention are listed as follows:

American Electric Manufacturing Company, Chicago, Ill.; Stromberg-Carlson Manufacturing Company, Rochester, N. Y.; Frank B. Cook, Chicago; B. F. Swanson Typewriter Company, Des Moines, Iowa; J. B. Terry Company, Cedar Rapids, Iowa; Monarch Telephone Manufacturing Company, Fort Dodge, Iowa; Dalton Adding Machine Company, Des Moines, Iowa; Downing Electric Company, Des Moines, Iowa; Cracraft-Leich Company, Genoa, Ill.; Electric Appliance Company, Chicago; Kellogg Switchboard and Supply Company, Chicago; Nungesser Electric Battery Company, Cleveland, Ohio; Dean Electric Company, Elyria, Ohio; Minnerallac Electric Company, Chicago; Burroughs Adding Machine Company, Des Moines, Iowa; American Telephone Appliance Company, Chicago; Illinois Electric Company, Chicago; Jenkins & Company, motorcycles, Des Moines, Iowa; National Carbon Company, Cleveland, Ohio; Homer Roberts Manufacturing Company, Chicago; Standard Earth Auger Company, Chicago; Belden Manufacturing Company, Chicago; Schutz Manufacturing Company, Chicago; Louis M. Pignolet, New York; National Telephone Supply Company, Cleveland; R. S. Mueller, Cleveland; Blackburn Specialty Company, Cleveland; Morse Tree Insulator Company, Cleveland; Telephone Fire Insurance Exchange, Cleveland; Pyrene Fire Extinguisher, Cleveland; Krips-Wright Company, Philadelphia; The Specialty Device Company, Cincinnati; Frederick Drake & Company, Chicago; American Correspondence School, Chicago; Phono Print Company, Defiance, Ohio; Iwan Brothers, South Bend, Ohio; Electric Specialty Company, Cedar Rapids, Iowa; Winona Lightning Arrester Company, Winona, Minn.; Vote-Berger Company, La Crosse, Wis.; Wasson Reel Company, Clinton, Ill.; Chance Manufacturing Company, Centralia, Mo.; Boyd Manufacturing Company, Rockville, Ind.; Benjamin Electric Company, Chicago; Tri-City Electric Supply Company, Davenport, Iowa; Leona Linden Accounting System, Lewiston, Minn.; Gannett Electrical Company, Providence, R. I.

Ohio Commission News

The Sycamore Telephone Company, Sycamore, Ohio, petitioned the state public service commission for the right to sell its property to another company of the same name for 60,000, but has been refused as the price is considered too large. The company is incorporated for $75,000 and is owned by George A. Klahr, J. A. Klahr, F. C. Samsee and Emma M. Samsee.

Complaint has been filed with the commission against the Cleveland, Painesville and Eastern Trac-

tion Company by the Western Union Telegraph Company to the effect that the former company is stringing its high-tension wires in too close proximity to the Western Union lines and asking that it be restrained from so doing.

By declining to reopen the Kenton telephone consolidation case the public service commission places itself on record as being opposed to the physical valuation of plants in cases where permission is given one corporation to acquire part of the property of another. The reason given by the commission for not reopening the case is that it had satisfied itself that the property purchased from the Central Union Telephone Company by the Kenton Telephone Company was worth the price asked and that rates were not to be advanced thereby.

While the commission is required, technically, to investigate and make appraisal of telephone properties asking permission to issue bonds and does do so when it seems to be necessary, the members state they have not sufficient funds or the proper organization to make a valuation of every property that asks such permission, and declined to make a precedent requiring such action in all cases, claiming they have other means of satisfying themselves on such questions, in many instances.

According to a recent ruling of Attorney-General Hogan all mutual telephone companies which have been incorporated "not for profit" will come under the supervision of the commission when they lose their

ONE HUNDRED DOLLARS
IN CASH PRIZES

¶ In an effort to bring to the public mind a realization of the simplicity and certainty of long distance telephoning, and to overcome the feeling of dread with which most people undertake a long distance conversation, **Telephone Engineer** offers to its readers a series of four cash prizes for the four best short articles or essays on that subject. For a full understanding of the condition which it is aimed to correct, read the editorial in the January number. The conditions governing the contest follow. The cash prizes are:

First Prize,	**$50.00**	**Third Prize,**	**$15.00**
Second Prize,	**25.00**	**Fourth Prize,**	**10.00**

¶ Articles shall not exceed 2,400 words in length, and may be as short as desired.

¶ Manuscripts should be typewritten, double-spaced, and sent folded, not rolled.

¶ All manuscripts or inquiries should be addressed to "Contest Editor, Telephone Engineer, Monadnock Building, Chicago, Ill."

¶ Receipt of manuscripts cannot be acknowledged, nor will unavailable articles be returned.

¶ The contest will be closed July 1, 1912, and prize winners will be announced in the August number of **Telephone Engineer;** the prize winning articles will be printed as soon thereafter as possible.

¶ Articles will be read and prizes awarded by a board of judges, whose personnel will be announced in **Telephone Engineer.**

¶ **Telephone Engineer** reserves the right to buy, at its regular space rates, such articles as are deemed desirable, although not prize winners.

mutual features and engage in business outside of the membership which, it is claimed, will subject them to the provisions of the public utilities law.

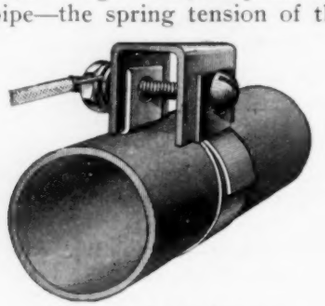
In response to the petition of the Hamilton Home Telephone Company for entrance into Cincinnati over the lines of the Cinnati and Suburban Bell Telephone Company, the latter, after contesting the right of such connection on its merits, has filed an answer with the commission in which it repudiates the jurisdiction of the commission and also its constitutional right to existence. It likewise questions the power of the legislature to enavt the public utilities law and the validity of the same. May other questions in constitutional law are considered.

Some time ago the United States Telephone Company was granted a permanent injunction against the Middlepoint Telephone Company restraining it from exchanging long distance service with the Bell Company, which has now been sustained by the Supreme Court. The Middlepoint Company had previously arranged with the United States Company for long distance service, but by making toll connection with the Bell Company made void its contract, which contract, however, was held to be illegal as this would tend to destroy competition. The Supreme Court, however, sustained this injunction on the ground that where one company operates long distance lines and the other a local exchange, it is perfectly legal for two non-competing companies to enter into a ninety-nine-year contract for physical connection and exclusive exchange of business.

The "Vogel" Ground Clamp

The Vogel clamp is designed for grounding telephone, telegraph, and signal lines and is being universally adopted by the leading companies in the field. It is self-contained, there being no detachable parts to become lost and it is claimed it can be adjusted in less than a minute and is cheaper and more permanent than a wrapped joint. As most ground connections are made to a water pipe, it is difficult to make a solder connection, therefore the use of ground clamps:

The band of the clamp is of 98 per cent pure, soft copper and heavily tinned with pure tin, the clamping piece is of spring brass and bolts and nuts of brass. The clamp remains tight under expansion or contraction of the pipe—the spring tension of the clamping



The Vogel Ground Clamp.

piece does the trick. There is no set screw bearing on the pipe or cable to puncture it, and the clamp is drawn closer to the pipe instead of away from it. This clamp is adjustable, fitting from one-half to two inch pipes or cables. It has been subject to the severest tests in service and will safely carry a discharge of 300 amperes.

The manufacturer is desirous of submitting sufficient samples for a thorough test to those companies who are not using this clamp in order to substantitate all claims. A line to the Fairmount Electric and Manufacturing Company, Philadelphia, Pa., will bring forth the samples.

Kellogg Furnishing Customers Advertising Cards

In line with the Kellogg Switchboard and Supply Company's live methods of assisting customers not only with practical engineering information but ad-

Departmental Telephones
For Public Buildings, Factories, Offices and Stores
A COMPLETE PRIVATE TELEPHONE SYSTEM, capable of handling the heaviest service, where the number of calls per day is not sufficient to need an operator and switchboard.
Sure in action, simple in operation.
Our intercommunicating system is compact, the apparatus being made with the same quality material and care as our standard wall telephones. Either wall sets or our regular desk telephones, with key box, can be used.
Each station can signal or talk to every other system with Key type signaling and switching. Can be furnished in 11 and 23 station size. Write or phone us for particulars.
Extension Telephones
Convenient—Time Saving
AN EXTENSION TELEPHONE in the library, upstairs, in the bedroom, or in distant parts of the house will prove an economy to you, not only in household management but in emergency business calls; as a fire and burglary protection, and as an every-day time saver.
Extension sets can be provided in different styles of telephones and we will be glad to submit rates and complete information on request.
Fill out and mail us this card today. Doing so will not place you under the slightest obligation.

The Cards Given to Customers.

vertising assistance the company is distributing free to customers two very attractive postal cards that can be used by the operating companies in their campaigns for subscribers and special service.

These cards, printed in two colors, illustrate and describe in a way appealing to the subscriber the advantages and economy of extension sets in homes or offices; and automatic push button intercommunicating systems for residences, offices, factories and warehouses.

On the stamp side of the card is the usual blank space for address in which the operating company can place its own address, making it a return card, which is enclosed in the regular correspondence to subscribers or with a personal letter to special list of people most apt to be interested in either service.

The space for the message on this side of the card is printed as follows: "Gentlemen: Kindly advise me as to the cost of an extension telephone per this card." Then follows space for subscriber's name and address.

The intercommunicating system return card is similar except that the message reads as follows: "Gentlemen: Kindly advise me as to cost of a private telephone system per this card."

The Kellogg Company will furnish samples of these "More Business Cards" promptly on request, and

they will be supplied to customers in quantities as desired without cost and to other operating companies cards will be supplied at a nominal price.

The Kellogg Switchboard & Supply Company is mailing out a card containing an interesting record of

Battered, But Still in Service.

a Kellogg desk telephone, illustrated on this page, that has been through fire in service since before 1904.

An unretouched photograph of the stand is shown on one side of the card with an outline of the service record and a testimonial letter from the telephone company manager. It is a significant outline of what can be expected in the way of sure service from Kellogg telephones. The card will be sent on request.

An Accident that Didn't Happen

The old adage "An ounce of prevention is worth a pound of cure," is rather shop-worn, but nevertheless it is as true now as when it was first written. Much has been said concerning the many ways in which the telephone has helped the railroads after an accident has occurred, such as getting information to headquarters and the starting of wrecking and relief expeditions to the scene of the disaster.

From the middle west there comes a tale which demonstrates that the telephone played an important part in an accident "that didn't happen." A trackwalker on one of the trans-continental railroads in stepping back upon the right-of-way after a fast train had passed noticed a broken flange that had ripped off one of the wheels of a car lying along the rails. What did this mean? It meant that one of the wheels was traveling at the rate of 45 or 50 miles an hour without a guide-band. It might go on through the entire journey without causing trouble, but, then again, in going around a curve it might cause that particular truck to leave the rail, and—but why speak of the disagreeable?

The trackwalker hastened to a siding switch, which was equipped with a Western Electric iron case telephone set, and told the dispatcher of his find. The dispatcher immediately telephoned ahead and had the train stopped, the damaged car removed from the tracks, and thus a possible accident was prevented.

A Rapid Restoration of Service

On Sunday morning, January 14, Birmingham, Ala., was visited by a disastrous fire which completely wrecked the four upper floors of the building of the Southern Bell Telephone and Telegraph Company on Second avenue and also dstroyed a five-story building adjoining. As a result of this, the entire toll switchboard, used for long distance connections and located on the fifth floor, became a complete loss, presenting a picture of warped iron work, molten copper and charred wood. The third, fourth and sixth floors were a mass of charred furniture and burnt papers, many records having been destroyed by the flames. The local switchboard and the associated frames and racks on the second and first floors, respectively, were not visited by the fire, but some damage was done by the water coming through from the other floors.

Within five hours after the fire started a representative of the Western Electric Company left Atlanta in company with officials of the telephone company. Immediately upon arrival at Birmingham, a survey was made of the gutted building, and it was decided to get together emergency switchboard equipment so that toll service could be restored, while pumping operations were begun to get the great volume of water out of the first and second floors. Telephone communication was established with the Hawthorne, Ill., factory of the Western Electric Company the same afternoon with the result that within forty-eight hours a complete new toll switchboard equipment, consisting of eight two-position sections with miscellaneous cable, was shipped by express to the scene of the fire.

Meanwhile an installing force was put to work on Monday morning, January 15, at 6:30 a. m. to assemble the temporary toll equipment forwarded from Atlanta, and by 1:30 p. m. of the same day toll communication was restored in temporary quarters obtained for that purpose. Owing to the damage done to the local switchboard equipment, a considerable amount of work was necessary; but by January 23, 70 percent of the local service was restored and the remainder on the following day.

The new toll switchboard arrived in Birmingham promptly, having left Hawthorne on Monday morning, January 15 at 2:40 a. m., and by dint of hard, rapid and careful work was put into service on Monday morning, January 29, at 2 o'clock, giving the telephone company a new, up-to-date toll equipment in fifteen days.

That so much was accomplished in so short a time is due to the untiring efforts of the plant department of the Southern Bell Telephone and Telegraph Company and of the Western Electric Company's force concerned in forwarding and installing the new equipment. The spirit of co-operation was evinced in every move with the result that the inconvenience suffered by the telephone-using public was reduced to a minimum. The fire, if it did nothing else, served to bring home to the people of Birmingham how absolutely essential telephones have become in every walk of life. Without them, the wheels of progress would quickly become clogged.

The minute you quit advertising in your trade paper its readers say, "What's the matter—Jones gone up the spout?" Not very charitable, but it's human nature.

A High Sensibility Galvanometer

Thompson-Levering Company bulletin No. 1010 shows a good design of high sensibility galvanometer which the company labels "Peerless." The claim is made that the sensibility of this galvanometer is up to 1,600 megohms.

Comprised of two units, one the magnet, the other the tube with the coil system, it is constructed so that all parts are readily accessible for cleaning. A ballistic system is used, and a damper is provided which may be simply attached if a dead beat system is required. A glass window puts every part of the instrument under the inspection of the operator, the removal of which window allows instant accessibility to all parts.

The coil is clamped on the back of the tube by a special lever arrangement that maintains perfect rigidity of the coil during transit but allows of quick release when the instrument is to be used.

Solid silver contact points are used, which automatically complete the contact when the tube is placed between the pole pieces in the magnet.

The development by rigid experiment allows of a special type of pole piece which gives a deflection to the current proportional throughout the entire scale; thereby insuring uniform sensibility.

The lens is the highest type of this kind of product procurable, and is thoroughly tested under conditions harder than the ordinary field work could impose.

Those interested in this brief sketch can doubtless be benefitted by writing to the company, whose address appears elsewhere in this issue, for a complete bulletin.

A Code Call and General Alarm System

The Stromberg-Carlson Telephone Manufacturing Company is calling attention to its "code call and general alarm system," whereby all telephone stations in a factory or office can be rung in code, calling the particular man wanted, wherever he may be, to the nearest telephone. No additional bells, circuits or special ringing devices are required with this system, an extra key mounted on the keyshelf of the p. b. x. board being all that is required. The code ringing of all the bells on the system at once with this key does not interfere with any conversation going on at the same time over the wires.

The great value of this novel device becomes more and more apparent as one contemplates the uses to which it may be put in a modern organization. With it any member of the office or factory force may feel free to leave his place, even when expecting a call, knowing that he will be located at once without delaying the caller. Some very large industrial concerns are already using the system with great satisfaction.

Every operating company wants p. b. x. subscribers, for they are profitable. With the addition of the s. c. feature the p. b. x. becomes very attractive, and its popularity among large telephone users is bound to increase.

This is only a brief sketch of the system. The Stromberg-Carlson Company will be glad to send its booklet, No. 2904, to any operating company which is ambitious to increase its p. b. x. customers.

Book Reviews

HANDBOOK OF STANDARD TELEPHONE CONSTRUCTION METHODS, by Frank B. Hall, is a new work of unique form. It is 5 by 8½ inches in size, with some 530 pages clipped together at one end in the loose-leaf style, with a black flexible leather cover. On the principle that a good picture explains more than pages of text, a large portion of the book is given over to illustrations—in fact, 250 of its pages. The remaining 280 pages are filled with construction specifications.

Some of the larger telephone operating companies have their standard specifications and drawings assembled in book form for the use of their employees. Such books, however, are available only when in actual use on jobs, and must be returned to the company. Mr. Hall's book may be regarded as a compilation of the best that has been used in all of these, with much original matter added. Some of the tables are especially valuable. All of the matter used is reduced to simple, non-technical language, readily understood by any workman.

Published by Frank B. Hall, Newton Falls, Ohio. Price $4.

DIE SELBSTANSCHLUSS-UND WAHLEREINRICH-TUNGEN IM FERNSPRECHBETRIEBE, by A. Kruckow. No doubt this book will find some demand in Europe, coming as it does from the pen of a specialist who deals in a critical manner with the various automatic systems which have acutally passed the experimental stage, and at a time when automatic telephony is coming so rapidly into public favor.

The writer deals with the various automatic systems, pointing out the changes introduced into the older methods of operation, comparing the two as regards cost, speed of operation, etc.

The book comprises twelve chapters which might be characterized as follows. The first chapter treats of calling devices. The second chapter discusses exchange connections and various types of wall and table apparatus. The third and fourth chapters give a description of the construction and operation of the selector switch at the exchange, that part of the equipment which automatically connect the subscribers with the number desired. The fifth chapter is devoted to auxiliary apparatus by which busy lines are indicated, the duplicate use of busy lines is prevented and calls are measured. Trunk line connections are discussed in the sixth chapter while the seventh and eighth chapters describe the interior of the exchanges, as well as the junction line working. The ninth and tenth chapters consider sub-stations and the operation of the system as found in small country sections.

The question of semi-automatic installations and the use of automatic selectors in manual exchanges as a labor saving device, are covered by the last two chapters.

Any reader having a good knowledge of existing telephone practice and familiar with the German language, will be able to gain a fair idea of the present state of automatic working as the descriptions are clear and the diagrams plain.

Every telephone man should get the folder issued by the Leeds & Northrup Company, Philadelphia, Pa., telling of reduced prices on portable testing sets. This is a rare chance to pick up a good set.

Western Electric Shows Slight February Decrease

Goods billed by the Western Electric Company during February totalled about 2 per cent less than for February, 1911; but last year began at a rate that was not maintained later in the year. This January's sales were 9 per cent below those of January, 1911. The first two months of the current year indicate a total business for 1912 of approximately $67,000,000. Sales for 1911 totalled $66,300,000. New orders received last month were $700,000 in excess of goods billed. This follows an increase in unfilled orders of $500,000 during January and means that for the two months incoming business has been $1,200,000 in excess of goods shipped out. In several lines, notably in sales to companies outside of the Bell interests, business last month was the best for any one month in the company's history. East, South and Central West districts showed up well, the falling off coming in the farther West. The East would naturally compare favorably with last year, for it was the East at that time that was showing the decline in general business that marked 1911 after the early months of the year.

At Hawthorne, Chicago, the buildings that have been completed within the last two years are sufficient to care for the company's present rate of production, and no new important construction is under consideration at the present time. Number of employees shows almost no change from a month ago.

Bell estimates of telephone construction requirements during 1912 call for a total of slightly over $55,000,000 of new work. With this as a starter and given a moderate revival even in business during the latter part of the year, it is not at all impossible that Western Electric will break through the previous high record of $69,000,000 gross business established in 1906. Foreign business is holding up well at about last year's rate.

Saved by the Mine Telephone

The public at large has already appreciated what great reason it has to be grateful for the invention of the telephone; but there are today two miners in Kansas who are more than grateful. They owe their lives to it.

These two miners, or "shot-firers," to be exact, are employed by the Girard Coal Company in a mine at Radley, Kansas. The mines of this company have recently all been equipped with Western Electric Company mine telephones, and, according to the rules of the coal company, the shot-firers must report to the night engineer, by means of the telephone, the progress of their work as they go through the mine lighting the shots. This enables the engineer to know where his men are, so that if he does not hear from them at certain intervals, a rescue party is sent down.

One evening after the miners had left, the shot-firers went down as usual to fire the shots which would bring down the coal for removal during the next day. The two men had just entered a refuge hole and one was in the act of ringing the engineer to tell him they had lighted the shots in that particular entry, when an explosion occurred. The force of the explosion was so strong that it blew in the back end of the refuge hole, and the shot-firer did not even get to talk, but was immediately overcome by the after-damp. His partner, who was with him, was likewise overcome. The night engineer, knowing that this was the station from which they should next report, immediately tried to call them, but was unable to get any response and started the distress whistle. In fifteen minutes after the explosion had occurred a rescue party was in this refuge hole and had the two shot-firers out working upon them and succeeded in resuscitating them. A little later it would undoubtedly have been impossible to revive them.

There is an employers' liability law in some states which compels the operator to pay a considerable sum for loss of life or personal injury. The fact that the telephone very often prevents accidents and assists in quick rescue work, saves the operator a great amount of money. In the Girard Company's mines there were three severe explosions during the winter, but not one of the Western Electric mine telephones was injured, nor was service interrupted.

Stromberg-Carlson Construction Bulletin

This is construction time, when the catalogs of manufacturers of construction material are thumbed over and over in search of new ideas, or new applications of old ones. A good deal of dependence is placed on these catalogs for many of them give actual directions for construction, with all manner of illustrations showing the details of operation.

Everyone contemplating construction work of any sort (and what telephone man is not?) must not fail to secure a copy of the Stromberg-Carlson Telephone Manufacturing Company's 1912 Construction Material Bulletin and price list. Its completeness, with the assured reliability of the company's product, makes it indispensable. The company will be glad to mail a copy to anyone requesting it. The address is Rochester, N. Y.

Pennsylvania Commission News

An interesting ruling is announced by the Pennsylvania Railroad Commission, the principle of what constitutes competition in a telephone field in Lawrence county being passed on.

R. J. Totten, operating a small telephone line at New Wilmington, complained to the commission that the Bell interests were offering competitive service with his line from an exchange at Volant at the rate of $12 a year, while he charged $18. He charged discrimination, but the commission stated that discrimination was when a company charged different rates for the same service in the same locality, and that if the Bell charged a lower rate than the complainant, there was no ground for charges of unreasonable competition. In the same connection the commission calls attention to the fact that all lines are required by state law to connect with all others, exclusive contracts being prohibited.

A circular describing No. 567 wrench and No. 765 ratchet handle for installing guy anchors issues from the house of W. H. Matthews & Brother, 3722 Forest Park boulevard, St. Louis, Mo.

D. Van Nostrand Company, New York, N. Y., publisher and importer of scientific and practical books, is moving from 23 Murray street to new quarters at 25 Park place.

The government of a Latin-American country has granted a concession for an underground telephone system in a certain city, with the privilege of erecting rural lines to other points in the country. A company is now being organized. This undertaking will create a demand for everything that is needed for the construction of such a line, and American manufacturers should communicate at once with the person in charge of the matter whose name and address are on file in the bureau of manufacturers, Washington, D. C., file No. 8314. This will be an entirely new system and will be a competitor of the old above-ground line which has been in operation in the city in question for many years.

In reply to an inquiry from the United States an American consul reports that all telephone lines in his district are owned and operated by the government. The demand for appartus is very small, being supplied mostly by home production, but if some special and superior apparatus were offered from abroad, it is possible that it would find a ready market. A list of firms that desire to carry up-to-date goods in these lines accompanied the report and can be obtained from the Bureau of Manufactures, Washington, D. C., refer to file No. 8332.

A telephone company which has been operating in a Latin-American city for several years with overhead wires is making arrangements to install an underground system. It is to be modern and up to date in every way, and an American consular officer writes that manufacturers of equipment in the United States should correspond without delay with the company. The name and address will be supplied by the Bureau of Manufacturers, Washington, D. C., file No. 8326.

The Electric Storage Battery Company has issued bulletin No. 135 describing the installation of the chloride accumulator for signaling and interlocking work at the new Chicago and Northwestern railway terminal in Chicago. Altogether 533 cells are used, ranging from No. 120 A. H. to No. 400 A. H. The story is extremely interesting and storage battery users should read it.

The Electrose Manufacturing Company started working in its new plant March 25. It is in the Robert Gair building, Brooklyn, and when completed will be about 50 per cent larger than the old one. The company is now in a position to work day and night, every day in the year if necessary, and will soon catch up with the orders delayed by the destruction of its old plant by fire.

Ericsson all-steel telephones, "Success" harmonic party line ringers and "No. 3" test sets are described and illustrated in a neat circular issued by the L. M. Ericsson Telephone Manufacturing Company, Buffalo, N. Y.

Mathias Klein & Sons, Chicago, is distributing a folder descriptive of the Stephens ratchet wrench, designed to reach difficult nuts and caps where the ordinary wrench will not do.

Prof. Hadley Predicts Telephone Lessons

President Arthur T. Hadley of Yale predicts that in the near future lessons will be taught over the telephone. At the recent banquet given by the Yale Club in Chicago, Prof. Hadley delivered his annual address from his home in New Haven over the telephone, and it was followed with the deepest interest by the two hundred guests seated about the banquet board in the Blackstone Hotel in Chicago.

Each guest sat with a receiver to his ear while Prof. Hadley distinctly addressed the members of the club. So successful was the experiment that it will be repeated elsewhere. It makes it possible to bring eminent orators from a distance to us in a very few minutes, just as the phonograph has preserved the voices of great singers to be enjoyed by the generations of the future.

If an orator can address an audience from a great distance, why is it not possible for the faculty of the great college to instruct students by the same process?

Prof. Hadley is so enthusiastic over the success of his Chicago address that he is to deliver another at a greater distance.

Connection Law Claimed to be Invalid

That the act of the Ohio legislature conferring upon the public service commission power to compel connections between telephone exchanges owned and operated by separate individuals or corporations is unconstitutional is the contention of the American Telephone and Telegraph Company and the Cincinnati and Suburban Bell Telephone Company, in answers filed with the public service commission to the complaint of the Hamilton Home Telephone Company, charging discrimination and inability to communicate directly with Cincinnati. They maintain further that such action would be state regulation of interstate commerce.

The answers deny that the Hamilton company cannot communicate directly with Cincinnati or that public convenience demands the connection sought with the Hamilton company. The Cincinnati and Suburban Bell Company says its service has been offered to the company, but rejected.

Government Ownership of Telephones

A bill has been introduced in the federal House of Representatives to provide for the condemnation, acquisition, and construction by the United States of the telephone lines, properties and holdings in the United States and to provide for the operation of same by the United States. The power to determine the market value of the properties thus to be acquired is to be vested in the Interstate Commerce Commission, and that body, the Postmaster general and the commissioner of telephones, an official to be appointed, are to decide which company should be proceeded against first.

Reorganization of Chicago Independent

Properties of the Illinois Tunnel Company, Chicago, were sold at public auction March 26 for $5,000,000 to Louis C. Krauthoff and William S. Tod, purchasing committee of the reorganization committee appointed by the bond and stock holders of the Chicago Subway Company, the Chicago Warehouse and

Terminal Company, the Illinois Tunnel Company and the Illinois Telephone Construction Company. The sale was conducted by Master in Chancery Charles B. Morrison. Only one bid was submitted.

Proceedings began at 12 o'clock outside of the Washington street entrance of the county building. One hundred persons were present. Mr. Krauthoff and Mr. Tod handed a certified check for $100,000 to Mr. Morrison. This was required by court order in case the bidder should be a present holder in the Illinois Tunnel Company.

"How much am I bid?" asked Mr. Morrison.

"Five million dollars," said Mr. Krauthoff.

Officials of the tunnel company say that the sale will facilitate the reorganization of the allied companies on a sound financial basis.

Ohio Commission Act's Validity Questioned

Rigid and searching examination of the Ohio public utilities law by the courts to test its validity and determine whether or not it be in conflict with the United States or the Ohio constitution, is foreshadowed by the answer filed March 7 with the Public Service Commission of Ohio by attorneys for the Cincinnati and Suburban Bell Telephone Company.

The document pertains to the contest instituted by the Independent Telephone Company at Hamilton to gain entrance to Cincinnati over the Bell lines. It is the culmination of years of such effort, this being the first time the case ever promised to come to trial before the courts upon its merits.

That the Cincinnati and Suburban Bell Telephone Company anticipates that the Public Service Commission will decide in favor of the independent lines seems to be indicated by the comprehensive character of the answer filed to-day, containing, as it does, at least half a dozen questions of constitutional law upon which the case may be appealed from the commission to the highest courts in the state.

This decision by the commission has also been forecasted by its refusal a week ago to have the numerous suits concentrated into one, the request being that of the Cincinnati company and made upon the ground that the identical questions are involved in all the suits.

The Bell Company in its answer not only contests the proposed connection on the merits of the contention, but denies that the Public Service Commission has any constitutional right to its existence or has any jurisdiction in this case, denies that the law is valid and that the general assembly had any power to enact it, and in addition it also cites a clause from the law upon which a claim is based that the independent has no right to ask for the connection.

Violation of the United States constitution is set up on a theory that the enforcement of such a connection would, in effect, deprive the Bell Company of its property without due process of law and without compensation. It is also charged that it would interfere with existing contracts and greatly restrict the company's right of free contract in the future. In addition to these, which involve also alleged violations of the Ohio constitution, it is argued that the public utilities act creates an unwarranted and arbitrary distinction between corporations of the same class, and, therefore, is contrary to the Ohio constitution.

Brevities of the Business

PERSONAL NOTES.

William Markham of Bennett, Neb., has been appointed manager of the Surprise Telephone Company in David City, Neb., succeeding Frank R. Miller, resigned.

Announcement has been made that the Postmaster-General has appointed Major O'Meara, C. M. G., R. E., Engineering Special Commissioner with the duty of examining and reporting upon the telegraph and telephone systems of Europe. Since April, 1907, Major O'Meara has been engineer-in-chief of the postoffice, but the state of his health is such as not to permit of his retaining this position longer. Major O'Meara will be succeeded as engineer-in-chief by W. Sligo, an assistant-engineer-in-chief at the postoffice.

G. L. Saunders has been appointed manager of the Interior Telephone Company, Grinnell, Iowa, succeeding Frank McNally, resigned.

Martin H. Buehler, formerly auditor of the Bell Telephone Company of Pennsylvania, has been elected second vice-president and general manager of the Chesapeake and Potomac Telephone and Telegraph Company.

F. T. Reed, for several years local manager of the Southwestern Telegraph and Telephone Company at Gainsville, Texas, has been promoted to the position of district commercial manager of the company, with headquarters at Corsicana.

George Cannon, for the past six years general superintendent of the Youngstown Telephone Company, Youngstown, Ohio, has been appointed telephone expert for the Public Service Commission of that state.

Charles T. Moon, Columbus, Ohio, has been appointed manager of the southern district of the Columbiana County Telephone Company, with headquarters in East Liverpool, succeeding D. A. Taylor, recently resigned.

W. Davies has been appointed manager of the Dakota Western Telephone Company, Culbertson, Mont., succeeding A. L. Kane, resigned.

E. G. Ferrell, district commercial manager of the Southwestern Telegraph and Telephone Company, with headquarters at Galveston, has been transferred to Dallas and he will be succeeded at the former place by L. M. Kelsey, district commercial manager of the company at Beaumont. Mr. Kelsey will be succeeded at Beaumont by G. J. Todd.

Ben S. Read, division superintendent of the Cumberland Telephone and Telegraph Company at New Orleans, has been appointed general manager of the Missouri Bell Telephone Company for the eastern district of Missouri, and for the state of Arkansas. He will be located in St. Louis. Mr. Read has served the company for a number of years and in various capacities, having started as messenger boy, and has rapidly advanced to his present position. He will be succeeded at New Orleans by C. A. Stair, local manager of the New Orleans office, and also an experienced telephone man. T. B. Baird will take the management of the New Orleans office.

William J. Camp, electrical engineer for the Canadian Pacific, has been promoted to the position of assistant manager of the company with headquarters at Montreal. Mr. Camp has been connected with the company since 1884 and this promotion comes in recognition of long and faithful service.

Frank D. Chase, associate member of American Society of Civil Engineers, architect of the Western Electric Company, has opened offices in the Peoples' Gas building, Chicago, for the practice of architecture and industrial engineering, making a specialty of manufacturing plants and mercantile buildings.

E. D. Nims, vice-president of the Pioneer Telephone and Telegraph Company of Oklahoma, has been elected first vice-president and treasurer of the Bell Telephone Company of Missouri and C. S. Gleed, president of the Pioneer Company, and also president of the Kansas and Missouri Telephone Company, has been elected chairman of the board of directors.

E. M. Northum, a well known telephone man, has just received a patent on a registering device for telephone toll messages. It is a slot machine which will preserve a record of each message. It is stated the device will be the means of saving telephone companies a great deal that they now lose through failure to record messages.

Frank Flourney has been appointed manager of the Cumberland Telephone and Telegraph Company's office at Memphis, Tenn. Mr. Flourney was first connected with the company in the capacity of messenger boy and his advance-

Ray Eddy, formerly local manager of the Overland Telephone Company at Williams, Ariz., has been promoted to the position of district manager with headquarters at Flagstaff. He is succeeded at Williams by E. A. Adams.

W. L. Brush has been appointed manager of the Federal Telephone Company's exchange at Batavia, N. Y., succeeding R. F. Sterling, resigned.

W. J. Ennis, district wire chief of the Wisconsin Telephone Company in the Green Bay district, has been appointed manager of the company's exchange at Fond du Lac.

E. G. Ferrell has been appointed district manager of the Southwestern Telegraph and Telephone Company, with headquarters at Dallas, Texas.

J. F. Casserly, manager of the Wisconsin Telephone Company's exchange at Fond du Lac, will enter the engineering department of the consolidated companies in Chicago.

April 1, E. Max Eaton, president and general manager of the Niagara County Home Telephone Company, Niagara Falls, N. Y., retires from this position to assume the management of the Niagara Searchlight Company, Niagara Falls, of which he is president. By this act Mr. Eaton terminates twenty-two years of active service in the telephone business, eleven years having been spent with the Bell and eleven with the independent. He, however, still retains his fianancial interest in the companies operating at Niagara Falls, Lockport, Tonawanda and North Tonawanda, but on account of the demands of personal affairs feels compelled to relinquish all executive duties.

Arthur Lockwood, formerly connected with the Western Electric Company, has joined the sales department of the Brookfield Glass Company.

W. H. McDonough, formerly publisher of the *American Telephone Journal*, was a visitor at the offices of TELEPHONE ENGINEER during a recent stop in Chicago. Mr. McDonough's interest in the telephone game has not cooled, although he is out of it now, and his "old-times" conversation is as interesting as ever.

NEW TELEPHONE COMPANIES.

MAGNOLIA, ARK.—The Southwestern Telegraph and Telephone Company has increased its rates since purchasing the Southern Telephone Company, and as a result, a new company to be known as the Home Telephone system, has been organized here.

HOT SPRINGS, ARK.—James L. Graham, a local attorney, has been employed by James T. Gray and other capitalists of Pittsburg, Pa., to draw up articles of incorporation for the Arkansas Telephone and Telegraph Company, which promises to enter this as well other southern states, in opposition to the Morgan interests. It is stated the company will have a capitalization of $100,000, and will have its headquarters in this city.

LITTLE ROCK, ARK.—The Arch Street Telephone Company has been incorporated with a capital stock of $5,000 by R. S. Parker, Dan Ranch, Louis Kirby, Edwin Watters, James Dorrough, Dr. S. P. Junkin, Peter Rau, Frank Nichols, Jos. F. Goodman, Otto Schlieser, A. C. Read, and R. D. Partee.

ELK GROVE, CAL.—The Elk Grove Farmers' Mutual Telephone Company has been incorporated by a number of farmers of this vicinity and it is the purpose to immediately install a telephone service throughout the delta region of the Sacramento.

RIVERSIDE, CAL.—Articles of incorporation have been filed for the Interstate Telegraph Company, with a capital stock of $500,000, by P. E. Ellis, James Smythe and William Muller. It is the purpose of the company to operate telephone and telegraph lines.

MERCED, CAL.—The Merquin Telephone and Electric Light Company has been incorporated with a capital stock of $25,000, and the officers are as follows: President, A. L. Bruce; secretary, David Larson; treasurer, W. H. Joy; directors, the above officers and J. W. Bower, Charles Bloom, W. T. Coker, J. A. Blow, and D. C. Van Clief. It is the purpose of the company to furnish Stevinson county with telephone and electric light service.

SARATOGA, CAL.—Articles of incorporation have been filed by Dean Genders, J. C. Dooley and Wallace Denning, for the Saratoga Telephone Company, with capital stock of $10,000.

HOLTVILLE, CAL.—The Valley Telephone Company has been incorporated with a capital stock of $25,000, by O. N. Shaw, J. W. Hart and P. C. Curtis, who are also directors of the company.

STEAMBOAT SPRINGS, COLO.—The East Cedar Telephone Company has been organized.

FOWLER, COLO.—The Omer Telephone Company has been incorporated with a capital stock of $5,000, by E. C. Mulheim, C. A. Watson, L. H. C. Mulholm, S. J. Watson and Ralph Rickstrew. The company will operate in the counties of Otera, Pueblo and Las Animas.

NEZ PERCE, IDAHO.—N. H. Jacob and associates, have incorporated the Idaho Farmers' Co-operative Telephone Company.

EL DARA, ILL.—The El Dara and New Canton Telephone Company has been incorporated with a capital stock of $600, to operate a telephone system. The incorporators are H. A. Trautwein, O. E. Chase and J. R. Fesler.

NORTON, IND.—Articles of incorporation have been filed for the Norton, Iuka and French Lick Telephone Company, with a capital stock of $4,000, to operate telephone lines. The incorporators are H. F. Simmons, J. Bledsoe and J. H. Johnson.

KEMPTON, IND.—The Citizens' Telephone Company of Kempton has been incorporated by J. G. Kemp, L. H. Barnett and J. H. Back, with a capital stock of $10,000.

ZEARING, IA.—The Zearing and Johnson's Grove Mutual Telephone Company has been incorporated with a capital stock of $3,500, by William Hogg, F. S. Eddy and Stephen Carmody.

LITTLE SIOUX, IA.—The Sioux Valley Telephone Company has filed articles of incorporation with the secretary of state; capital stock, $226. The incorporators are A. M. Rolph, E. Stucker and J. W. South.

GREENFIELD, IA.—The Willow Grove Farmers' Mutual Telephone Company has been organized with a capital stock of $5,000. The officers are as follows: President, T. D. Utts; vice-president, R. D. Mowry; secretary and treasurer, T. W. Fitzgerald; directors, Frank Conway, M. D. S. Neilson and W. H. Sparling.

ZWINGLE, IA.—The Zwingle Telephone Company has been incorporated by John P. Higgins, D. W. Leffert and Jacob Kemerer.

MT. HOPE, KAN.—The Mount Hope Telephone Company has been incorporated with a capital stock of $1,500.

HARTFORD, KY.—The Hartford Telephone Company has been incorporated with a capital stock of $10,000, by William W. Crawford, W. T. Hale and J. Joseph Hettinger, all of Louisville.

HARDYVILLE, KY.—The Hardyville Telephone Company has been incorporated with James Morris as president.

SPRINGFIELD, KY.—The Tobin Telephone Company has been organized by John Tobin, M. B. Hardin and H. S. Fenwick, with headquarters in this place.

ZEELAND, MICH.—The farmers in this vicinity are planning the organization of an independent telephone company. Among those interested are the following. William Albright, Ed Tanias, Albert Ensing, H. Zwiers, Ch. Kok, G. H. Nyenhuis, J. Van Rhee, B. Nyenhuis, D. Ve Vree, Jacob Nyenhuis, Albert H. Bosch, Ed Ver Hage, H. Lippenga and John Freriks.

VERMONTVILLE, MICH.—Articles of incorporation have been filed for the Vermontville Farmers' Independent Telephone Company, with a capital stock of $25,000. The incorporators are James M. Andrews, Chester; C. J. Warner, E. F. Tubbs and Hallis Y. Patterson of Vermontville.

ATKINS, MICH.—The North Street Telephone Company has been organized by Allan W. Smith, David Beard, Joseph C. Mitchell and others, with a capital stock of $1,500.

TRESCOTT, MICH.—A telephone company has been incorporated in this place by John Finger, J. R. Thorne and H. Finger, the latter being secretary of the company.

TENSTRIKE, MINN.—A new telephone company has been organized in this place with the following officers: President, E. E. Shulke; vice-president, S. E. Thompson; secretary, H. Stechman; treasurer, A. L. Morris.

WINONA, MINN.—The O. Miller Telephone Company has been incorporated with a capital stock of $30,000.

FRIBERG, MINN.—Articles of incorporation have been filed for the Friberg Telephone Company, with a capital stock of $3,500, and the officers are as follows: President, Ferdinand Peters; vice-president, Arthur A. Krause; secretary, E. W. Lepeer; treasurer, Herman Dennow.

CAMBRIDGE, MINN.—The Stanley Rural Telephone Company has been organized with E. R. Anderson as president, and will construct a line to Spring Lake.

HAMBURG, MINN.—The Tri-County Co-operative Telephone Company has been incorporated by H. Strengler of Green Isle and Fred Buck and A. A. Graupman of Hamburg, with a capital stock of $50,000.

RULEVILLE, MISS.—The Burl Bayou Telephone Company has been incorporated with a capital stock of $10,000, by J. W. Riddell, T. B. Brown and others.

LAKESIDE, NEB.—The Lakeside Telephone Company has been incorporated by C. H. Tulley, John H. Luneford and Jacob Herman.

CURTIS, NEB.—The North Star, Sheridan and Curtis Telephone Company has been incorporated by R. A. Wilson and others.

ANGELICA, N. Y.—The East Angelica Telephone Company has been organized with the following officers: President, Jessee Bullock; secretary, David Evans; treasurer, Ray Wafler.

HIDDENITE, N. C.—The South Yadkin Telephone Company has been incorporated with a capital stock of $4,500 by D. H. Leener, W. C. Beckham and others.

WELCOME, N. C.—A charter has been issued to the Davidson Telephone Company; capital stock, $5,000. The incorporators are J. C. Ripple, N. L. Hinkle, E. J. Zimmerman and Franklin Hoover.

RALEIGH, N. C.—Articles of incorporation have been filed with the secretary of state for the Lawlor, Stone Telephone Company, of Rowan county; capital stock, $25,000. The incorporators are C. M. Fisher, Julian Frick, George S. Klute and others.

EAST BEND, N. C.—The East Bend Telephone Company has been incorporated with a capital stock of $3,250, and the incorporators are John W. Doub, A. M. Smitherman, P. A. Davis, E. I. Williams, T. H. Hutchens, M. T. Springle and others.

WOLFORD, N. D.—The Union Telephone Company has been incorporated with a capital stock of $3,000, by J. T. Hawk, George Baker and Harry B. Flinn.

GRAFTON, N. D.—The Kellogg Rural Telephone Company has been organized with the following officers: President, Martin Moe; secretary, A. H. Tweteen; treasurer, Tom McHagen.

CROSBY, N. D.—The Divide Rural Telephone Company has been incorporated to operate a telephone system in Divide, Burke and Mountrail counties; capital stock, $20,000. The incorporators are Orlando Henderson, W. C. Martin and Blake Lancaster, all of Crosby.

ROSSVILLE, OKLA.—The Rossville and Line Telephone Company has been incorporated by C. C. Platz, W. Pingrey, J. V. Thomas, G. M. Gentry and C. M. Conley of Wellston.

HAMMON, OKLA.—The Moad Telephone Exchange has been incorporated with a capital stock of $6,000, by J. A. Moad and J. S. Moad of Hammon, and G. Moad of Carpenter.

MAY, OKLA.—The May Telephone Company has been incorporated with a capital stock of $2,500, by J. E. Feather, Joe Phillips and T. M. Fleming.

HILLSBORO, OREG.—The Hillsboro Telephone Company has been incorporated with a capital stock of $25,000, by O. G. Wilkes, J. B. Wilkes and G. Stevens.

MOLALLA, OREG.—The Molalla Telephone Company has been incorporated with a capital stock of $2,500.

EAGLE POINT, OREG.—Articles of incorporation have been filed for the Brownsboro Telephone Company with a capital stock of $1,200. The incorporators are E. Herron, E. D. Colby and Frederick Pelouse.

CANBY, OREG.—The Canby Mutual Telephone Company has been organized by J. P. Cole, W. A. Tice, George Koehler and Frank Zoeliner, of Canby; Elmer Veteto, New Era, and W. W. Jesse, Barlow.

BRUNNERVILLE, PA.—The Brunnerville Telephone and Telegraph Company has been incorporated with a capital stock of $3,000; treasurer, Elmer C. Geyer.

NASHVILLE, TENN.—Articles of incorporation have been filed for the Rome Telephone Company, to operate in Smith county. The capital stock is $1,000, and the incorporators are John B. Wilson, A. W. Gann, R. A. Braswell, G. W. Thompson and A. S. Oliver.

DYER, TENN.—The Dyer Home Telephone Company has been incorporated by W. L. Terrell, M. D. King, C. L. Haste and others, with a capital stock of $5,000.

CARMINE, TEX.—The Farmers' Rural Telephone Company has been organized by Ad Giessel, E. E. Wolle, Charles Enrich and others.

HEBER CITY, UTAH.—The Center Creek and Daniel Telephone Company, capital stock $2,000, has been incorporated with the following officers: President, G. Frank Ryan; vice-president, Eli Swain; secretary-treasurer, O. G. Olsen.

ALTAVISTA, VA.—The Altavista Telephone Company has been incorporated with a capital stock of $15,000. The officers are as follows: President, W. B. Elwood, Centerville, Ind.; vice-president, Fred E. Teas, Centerville, Ind.; secretary-treasurer, G. R. Jordan, Altavista.

ORIENT, WASH.—The Columbia and Kettle River Telephone Company is a new concern to be incorporated here with a capital stock of $3,000, with the following directors, Fred Shiner, George Lane and Kelly Hill.

DENISON, WASH.—The Denison Telephone Company has been organized with the following officers: President, O. E. Daniels; vice-president, James Baker; secretary, I. G. Page; treasurer, F. H. Berry.

LAMOINE, WASH.—The Union Telephone Company has been incorporated by A. B. Cunningham, C. V. Slusser and others, with a capital stock of $2,500.

CANFIELD, W. VA.—The Buffalo Telephone Company has been incorporated with a capital stock of $4,000, by D. L. Long, Sutton; Robert Tinney, L. L. Jackson and W. T. Cox of Little Birch; W. A. Tucker, Canfield.

HIGHLAND, WIS.—H. B. Pierick, William Manning, Herman Effinger and Frank Hudek have incorporated the Red Oak Telephone Company.

TOMAHAWK, WIS.—The Tomahawk Light, Telephone and Improvement Company has been incorporated with a capital stock of $50,000, by R. N. Van Doren, A. T. Curtis and George Curtis, Jr.

FINANCIAL ITEMS.

ROANOKE, ILL.—The capital stock of the Roanoke Telephone Company has been increased from $2,000 to $6,000.

BELVIDERE, ILL.—Permission has been granted the Belvidere Telephone Company to increase its capital stock from $50,000 to $80,000. This is the plan taken to raise the necessary sum to take over the local lines of the Central Union Telephone Company.

WELLINGTON, O.—The Wellington Telephone Company whose total capitalization is $36,500, has applied to the public service commission for permission to dispose of $3,500 additional common stock to pay off notes amounting to $3,300 and to make necessary improvements.

FRANCHISES ASKED AND GRANTED.

BLACK ROCK, ARK.—The Smithville Rural Telephone Company, with headquarters at Smithville, has been granted a ten-year franchise in this place. The company will also install a service at Imboden.

PASADENA, CAL.—Following the ultimatum of the South Pasadena board of trustees to either secure a proper franchise or remove from South Pasadena, the Home Telephone Company of Los Angeles, has applied to the council for a franchise which will be drawn up and offered as soon as conveniently possible.

ST. CHARLES, ILL.—The Interstate Telephone and Telegraph Company has made application to the St. Charles council for a 20-year franchise in that place. The company offers the following rates: One party residence, $24 per annum; two party residence, $18; four party residence, $12; one party business, $30; two party business, $24; four party business, $18.

DAVENPORT, IA.—The Tri-City Automatic Telephone Company will ask for a franchise in this place at the election April 6.

LIBERAL, KAN.—C. D. Gasaway is seeking a franchise in this place.

COLUMBIA FALLS, MONT.—The Columbia Falls Telephone Association has petitioned for a franchise in this place and the matter will be voted upon at the spring election.

Winston-Salem, N. C.—The Spanish Grove Independent Telephone Company has been granted a franchise to install a telephone system.

Creswell, Ore.—George M. Hawley and Schmitt Bros. are asking for a franchise in this place.

Longview, Tex.—The city council has granted the Lacy Telephone Company a new franchise with the provision that all wires on the business streets must be placed under ground, the company also agreeing to install a central energy plant within a year.

Katy, Tex.—The county commissioners have granted the Katy Mutual Telephone Company permission to install a mutual telephone system. Among those interested in the company are W. J. Alderson, John Cope, T. E. W. Brand, E. M. Bennett.

Lufkin, Tex.—The city council has granted a franchise for a new automatic telephone system. J. T. McClendon and others are the promoters.

Albion, Wash.—The Farmers' Inland Co-operative Telephone Company has been granted a 20-year franchise.

RATES.

Sacramento, Cal.—As a result of extended negotiations and consultations with the Pacific Telephone and Telegraph Company the Merchants' and Manufacturers' Traffic Association has succeeded in securing a marked reduction in the long distance telephone tolls between Sacramento and Central and Superior California points.

Montreal, Quebec.—The Bell Telephone Company has made application to the Dominion Railway Board of Commissioners for the establishment in this city of the standard rate of $55 for business telephones and $35 for residence. The city authorities have also applied for a general reduction in rates.

Penticton, B. C., Can.—Since the absorption of the local telephone system by the Okanogan Telephone Company rates have been increased to $4 per month, which is meeting with considerable protest from the subscribers who claim that in accordance with the franchise agreement rates cannot be raised above $3.

Conyers, Ga.—On account of the increase of telephone rates in this place an independent telephone company has been organized and the city council has granted an exclusive franchise to the new company.

Alma, Mich.—The Union Telephone Company recently increased its rate for rural service from $12 to $15, claiming there could be nothing made at the old rate.

Gates, N. Y.—Having failed to reach an agreement on rates with the New York Telephone Company, a number of residents of Gates have determined to form an independent organization. It is said right-of-way for connection with the Ogden Telephone Company has been secured and construction work will begin at once.

Jeannette, Pa.—The Central District and Printing Telephone Company has reduced its rates in this place to $30 for business telephones, $21 for two-party, $21 residence, and $15 two-party.

Pierre, S. D.—The Brookings County Telephone Company applied to the railway commission for permission to change its rates. The Steninger Telephone Company of Parker applied for permission to lower toll rates, which was granted and the Citizens' Telephone Company of Artesian asked permission to increase rates, which was left for future action.

Tacoma, Wash.—The Sunset Telephone Company has filed a schedule of rates with the public service commission asking permission to waive the statutory notice and put it into effect at once and as the rates are a reduction it is probable the permission will be granted.

MISCELLANEOUS.

Cullman, Ala.—The Commercial Club is negotiating for the installation of an independent telephone system in this place in opposition to the Bell company.

Harrisburg, Ark.—The Southwestern Telephone Company has purchased the Going Telephone Company, which consists of a system in this city and systems at Cherry Valley, Wynne, Parkin, Earle and Crawfordsville and long distance lines. The consideration was $85,000.

Argenta, Ark.—The Southwestern Telephone and Telegraph Company will replace its wooden poles in certain parts of the city with steel poles.

Camden, Ark.—A number of telephone lines entering the city have been consolidated and will be known as the J. M. Simms Consolidated Telephone Company. The following officers have been elected: President, E. P. Reynolds; secretary and treasurer, W. H. Fearing.

Texarkana, Ark.—In compliance with the order of the United States court the Texarkana Telephone Company, which has been in the hands of a receiver, has been turned over to the stockholders. A. C. Stuart, receiver, was elected vice-president and manager of the company in its reorganization. The other officers are: President, Congressman John J. Lentz of Ohio; secretary, J. F. Rochelle.

Arkadelphia, Ark.—The Southwestern Telephone Company is making arrangements to spend $50,000 in overhauling and rebuilding the system in this city. A central energy system will be installed, work to be completed by the middle of June.

Macdoel, Cal.—The Butte Valley Telephone Company will improve and extend its system.

Kelowna, B. C., Can.—The urban and rural telephone systems owned by H. H. Millie have been taken over by the Okanogan Telephone Company for a consideration of $55,000.

Atlanta, Ga.—The officers of the Southern Bell Telephone Company for the ensuing year are as follows: President, W. T. Gentry; general manager, J. Epps Brown; vice-president, J. M. B. Hoxsey; auditor, C. J. Holditch; treasurer, T. D. Webb; assistant treasurer and secretary, A. Maupin.

Boise, Idaho.—An ordinance has been passed requiring all telephone wires to be placed underground by January, 1913.

Dixon, Ill.—The Home Telephone Company has purchased all the lines of the Bell Telephone Company in Lee county. They will discontinue all of the Lee county local service owned by the Bell company and will use the Bell company's long distance service.

Chicago, Ill.—D. C. and William B. Jackson, consulting engineers, have removed their Chicago office from the Commercial National Bank building to the twentieth floor of the new Harris Trust building, 11 West Monroe street.

Kendallville, Ind.—The Home Telephone Company will install a $20,000 cable between this place and Goshen which will require a large amount of material.

Anderson, Ind.—At the annual meeting of the stockholders of the Delaware and Madison Counties Telephone Company the following officers were re-elected: President, George W. Beers, Fort Wayne; vice-president, W. H. H. Quick, Anderson; secretary, Theodore F. Rose, Muncie; manager, L. W. Scattergood.

Elkhart, Ind.—The Home Telephone Company is preparing to erect a new exchange on West High street at an estimated cost of $75,000.

Bluffton, Ind.—The United Telephone Company has elected the following directors. Hugh Dougherty, W. B. Cooley, J. L. Wayne and W. R. Hirst of Indianapolis; L. C. Davenport and J. W. Sale, Bluffton; John W. Sale, Ft. Wayne; A. G. Lupton, Hartford City, and C. M. Nesbit, Anderson.

Emerson, Ia.—The Emerson Mutual Telephone Company has elected the following officers: President, Willis Patrick; vice-president, J. F. Jones; treasurer, E. C. Collins; secretary, O. R. Patrick; managers, C. E. Ballain, Gilbert Cheney and George Cross.

Tabor, Ia.—The local telephone system has been taken over by J. F. Simmerman and hereafter it will be known as the Randolph Telephone Company.

Chariton, Ia.—The Chariton Telephone Company has been taken over by the Iowa Telephone Company, which has purchased a controlling interest therein.

Roxbury, Kan.—The Roxbury Telephone exchange has been purchased by N. J. Mammel.

Dodge City, Kan.—The Arkansas Valley Telephone Company, which recently purchased the Dodge City exchange, will erect a new exchange building at a cost of $25,000.

Kingman, Kan.—The Independent Telephone Company has been taken over by the Missouri and Kansas Telephone Company.

Home City, Kan.—The Home City Farmers' Mutual Telephone Company has elected the following officers: President, John Hartman; vice-president, Charles Noller; secretary, S. C. Harry; treasurer, D. H. Beavers.

Kalkaska, Mich.—The Swaverly Telephone Company, operating exchanges at Petoskey, Pellston, Kalkaska, Boyne Falls, Mancelona and other places, has been consolidated with the Michigan State Telephone Company.